RAMAIAH
College of Arts, Science
& Commerce - Autonomous

DEPARTMENT OF BIOTECHNOLOGY
GOVERNMENT OF INDIA

MICROBIOLOGISTS SOCIETY
Microbes for Better Tomorrow
1996

NATIONAL CONFERENCE ON

Trends in Multidisciplinary Research: Challenges and Applications (TMRCA)

"Igniting Minds, Advancing Sciences"

15th & 16th May, 2024

ORGANIZED BY
DEPARTMENT OF SCIENCES
M S RAMAIAH COLLEGE OF ARTS, SCIENCE AND COMMERCE - AUTONOMOUS
BENGALURU 560054

"Trends in Multidisciplinary Research: Challenges and Application" (TMRCA 2024)

May 15th and 16th, 2024

Bengaluru, India

ABSTRACT BOOK

In collaboration with

Microbiologists Society Department of Biotechnology

(DBT Star College Scheme)

Government of India

Organized by

Department of Sciences

M S Ramaiah College Arts, Science and Commerce - Autonomous

Bengaluru 560054

Dr. M.S. Ramaiah, FIAE

(1922 -- 1997)

"A True Karma Yogi"

ABOUT THE COLLEGE

M. S. Ramaiah College of Arts, Science and Commerce -Autonomous (MSRCASC) was established in 1994 under the flagship of Gokula Education Foundation. Bangalore. The college is affiliated to Bengaluru City University (BCU). The college is recognized by the UGC under Sections 2(f) and 12(B) of the UGC Act of 1956. The Institution is reaccredited with "A" grade by NAAC in its 4th cycle in the year 2021. Its MBA program is approved by AICTE, New Delhi and recognized by the Government of Karnataka. It's been ranked in the band of 100-150 in the college category under National Institute of Ranking Framework (NIRF) 2023 making it one of the best colleges in Karnataka. The institution has been selected under the DBT-STAR College Scheme in 2021 by the Department of Biotechnology, Ministry of Science and Technology, Government of India. The Department of Biotechnology has been recognized as a Research Centre by Bengaluru City University in 2022.

ABOUT THE CONFERENCE

Science and technology are closely intertwined and play vital roles in human progress and development. Science seeks to answer fundamental questions and expand our knowledge, while technology focuses on practical problem-solving. This conference will provide the premier multidisciplinary forum for students, researchers, scientists, and industrialists to present and discuss the most recent innovations, trends, and practical challenges associated with science. It is planned as a major event to be held at M S Ramaiah College of Arts, Science and Commerce (MSRCASC), Bengaluru, India on 15th and 16th May 2024.

The conference's objective is to bring together adverse community of active researchers from India and create a professional environment conducive to learning, collaboration, and networking. This event is poised to facilitate the exchange of ideas and the exploration of cutting-edge developments in various scientific disciplines.

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Messages

Dr. M. R. Jayaram
Chairman,
Gokula Education Foundation

MESSAGE

As I pen this foreword note for the National Conference on "Trends in Multidisciplinary Research: Challenges and Applications" hosted by the Department of Sciences, M. S. Ramaiah College of Arts, Science and Commerce in conjunction with the Department of Biotechnology, Government of India, and Microbiologists Society, India, I'm deeply moved by a sense of pride.

This conference is a platform for fostering vibrant dialogue among researchers, students, and academicians, facilitating the presentation and discourse of the latest advancements in this dynamic field. I am confident that this collaborative exchange will ignite a spark, propelling similar endeavours within the institution and beyond.

With Best Wishes

Dr. M. R. Jayaram
Chairman

Dr. M. R. Seetharam
Vice-Chairman,
Gokula Education Foundation

MESSAGE

In the fast-paced world, technological progress and scientific breakthroughs are transforming our landscape at an unprecedented rate. To sustain this momentum, the next generation must remain abreast of the latest developments in science and technology.

Against this backdrop, the National Conference on "Trends in Multidisciplinary Research: Challenges and Applications," emerges as a vital platform for students, researchers, and industry professionals to exchange ideas and showcase innovations.

I am confident that the talks, oral presentations, and poster sessions will foster an environment conducive to meaningful discussions, nurturing a spirit of scientific inquiry.

I extend a warm welcome to all delegates, participants, and students, and offer my best wishes for a successful conference.

With Best Wishes

Dr. M. R. Seetharam
Vice-Chairman,

Sri. M. R. Janakiram
Director
Gokula Education Foundation

MESSAGE

I write this note with sincere appreciation to announce the successful execution of the National Conference on "Trends in Multidisciplinary Research: Challenges and Applications" by Ramaiah College of Arts, Science, and Commerce.

The triumph of this conference owes entirely to the dedication, diligence, and expertise of the researchers in the domains of Life, Chemical, and Health Sciences who have authored, submitted, and presented papers covering a diverse array of topics.

May the presenters find success in their respective research endeavours, contributing as invaluable assets to the world we inhabit. In extending gratitude to the Conference Organizing Committee, I also express my fervent hope for the continuation of such programs, fostering robust research development for the betterment of humanity

With Best Wishes

Sri. M. R. Janakiram
Director

Sri. Kodandaram Ramaiah
Director
Gokula Education Foundation

MESSAGE

In our fast-evolving world, staying abreast of scientific advancements is vital. The National Conference on "Trends in Multidisciplinary Research: Challenges and Applications" offers a crucial platform for students, researchers, and industry professionals to exchange ideas. I am confident that the talks and sessions will inspire meaningful discussions. A warm welcome to all delegates and participants, and best wishes for a successful conference!

Sri. Kodandaram Ramaiah
Director

Sri. B. S. Ramaprasad
Chief Executive
Gokula Education Foundation
(Engineering and General Sciences)

MESSAGE

The National Conference on "Trends in Multidisciplinary Research: Challenges and Applications" marks a significant milestone in the academic journey of M. S. Ramaiah College of Arts, Science, and Commerce. The conference will be a confluence of ideas from students, academicians, researchers, and scholars from the field of science. In addition to the contributed papers, the conference also has eminent scholars and scientists across the Country, to present the latest developments in the field of Biological, Chemical, and Physical Sciences.

The conference represents the efforts of many people. I congratulate the programme committee for organizing the conference of this magnitude and hope many more of these will follow.

With Best Wishes

Sri. B. S. Ramaprasad
Chief Executive

Sri. G. Ramachandra
Chief of Finance
Gokula Education Foundation
(Engineering & General Sciences)

MESSAGE

With a rich legacy in education and health sciences, the Ramaiah fraternity takes pride in organizing the National Conference on "Trends in Multidisciplinary Research: Challenges and Applications" at M. S. Ramaiah College of Arts, Science, and Commerce. The conference theme promises stimulating discussions, offering a platform for peer engagement and idea exchange, and fostering opportunities for research and development collaborations.

I extend my heartfelt appreciation to the diligent efforts of the organizing committee, who have not only curated a platform for presentations but also arranged a diverse array of talks covering a wide range of subjects. I am optimistic that this conference will serve as a focal point for exchanging knowledge and ideas.

Sri. G. Ramachandra
Chief of Finance

Dr. Vatsala G
Principal
M.S Ramaiah
College of Arts, Science and Commerce
Bengaluru-54

MESSAGE

In today's dynamic landscape, interdisciplinary collaboration is paramount. This conference serves as a crucial platform to explore the evolving trends, confront shared challenges, and delve into innovative applications across diverse fields of research.

Let's harness our collective intellect, creativity, and passion to address the pressing issues of our time. Together, we can chart a path towards ground breaking discoveries and impactful solutions.

Let us seize this opportunity to forge new connections, cultivate interdisciplinary synergies, and inspire one another to reach new heights of excellence.

Dr. Vatsala G
Principal

MICROBIOLOGISTS SOCIETY, INDIA

(Reg. No. MAH/4814/SAT)

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Ref. No.Mbio/con/23-24/709 Date- 04/05/2024

Message from Microbiologists Society, India

Ko

I am delighted to inform you about the upcoming National Conference on "Trends in Multidisciplinary Research- Challenges and Applications" scheduled to be held during 15 and 16 May 2024. This prestigious event will take place at the esteemed M S. Ramaiaha College of Arts and Science, Bengaluru

The conference aims to provide a platform for researchers, scholars, and professionals to discuss the latest advancements and challenges in Multidisciplinary research within the field of physical,Chemical and biological sciences.

Participants can look forward to engaging discussions, insightful presentations, and networking opportunities with experts from around the nation. This conference holds immense promise for fostering collaboration, sharing knowledge, and exploring innovative solutions to address the present issues in sciences.

I encourage researchers and enthusiasts alike to mark their calendars for this significant event. Let us come together to explore new horizons, overcome challenges, and propel the field of interdisciplinary science toward greater heights of excellence. I wish the conference a grand success.

A. M. Deshmukh

Key Note Speaker

Dr. B.S. Shankaranarayana Rao
Professor, Head and Registrar
Department of Neurophysiology
National Institute of Mental Health and Neuro Sciences (NIMHANS)

Neural plasticity and Brain Repair Mechanisms: New Challenges in Treating Neurological and Psychiatric Disorders

Neuronal plasticity is an extraordinary property of the brain and refers to the morphological, biochemical, behavioral and electrophysiological alterations in both the adult and developing nervous system. Thus, it is becoming increasingly clear that a regenerative and continuing mechanism for adaptive reorganization of the brain occurs because of the property of neuronal plasticity. This unique property of the nervous system may be responsible for the recovery of functions in several brain disorders including stress, anxiety, depression, epilepsy, aging, stroke and mental retardation. Stress is a condition that seriously perturbs physiological and psychological homeostasis, resulting in disorders ranging from anxiety to post traumatic stress disorder. Severe traumatic or repeated stress can result in long-term deleterious effects leading to depression and cognitive deficits. Prolonged stress induces learning and memory impairments, dopaminergic and cholinergic dysfunction, dendritic atrophy, decreases neurogenesis and long-term potentiation (LTP), alters sleep-wake cycle, and enhances degeneration of the hippocampal and medial prefrontal cortical neurons. These degenerative changes in the brain are associated with decreased neurotrophic factors mainly brain-derived neurotrophic factor (BDNF), alterations in NMDA receptors and tissue plasminogen activator (tPA) in the hippocampus. Thus, stress leads to regressive plasticity in the hippocampal and cortical neurons, the crucial brain regions involved learning and memory.

In contrast, brain stimulation rewarding behavioral experience (BSR) is known to increase dendritic arborization, spine and synaptic density, and increase neurotransmitter levels in the hippocampus. In addition, BSR facilitates operant and spatial learning, and ameliorates fornix-lesion induced behavioral deficits. Further, exposure to enriched environment results in an increase in dendritic arbors, spines, synapses and enhances dopaminergic and cholinergic transmission, neurogenesis and facilitates acquisition and performance in several learning tasks. Thus, BSR and enriched environment induces a robust plasticity in the hippocampus and frontal cortex. In addition, the cholinergic and dopaminergic drugs are also known to induce progressive plasticity. Accordingly, we have used multiple novel approaches to restore stress-induced cognitive deficits by inducing progressive plasticity at multiple levels of neural organization; namely, (i) Intracranial electrical stimulation of rewarding experience,

(ii) Chronic exposure to enriched enrichment, (iii) Pharmacological manipulation of dopaminergic and cholinergic transmitter systems, (iv) herbal drugs, (v) Enhancing BDNF levels in the forebrain regions including hippocampus and cortex, (vi) Inactivation of amygdalar neurons, and (vi) Altering tPA levels.

Our results demonstrate reversal of stress induced cognitive deficits and depression, dopaminergic and cholinergic dysfunctions, decreased neurogenesis, hippocampal LTP and neurodegeneration by BSR / EE. In addition, enhancement of dopaminergic and cholinergic neurotransmission in the hippocampus and frontal cortex in stressed rats by administration of dopaminergic or cholinergic agonists, antidepressants or herbal drugs ameliorated the stress-induced learning and memory deficits. The overexpression of BDNF or inactivation of amygdalar neurons prevents stress-induced hippocampal neurodegeneration and ameliorates cognitive deficits. Interestingly, stress-induced altered synaptic plasticity is regulated by tPA. Thus, multiple strategies are necessary to prevent / restore stress-induced cognitive deficits by restoring hippocampal and cortical neuronal dendritic atrophy, cholinergic and dopaminergic neurotransmission, synaptic plasticity in the hippocampus in terms of restoring long-term potentiation and activation of resident stem cells in the adult brain.

Chronic and prolonged stress is known to cause angiogenesis and depression. Severe depression compromises structural and functional integrity of the brain and results in cognitive deficits, maladaptive synaptic plasticity as well as degenerative changes in the hippocampus, amygdala and prefrontal cortex. The precise mechanisms underlying cognitive dysfunctions in depression remain largely unknown. Accordingly, we have attempted to address this issue by investigating behavioral, structural and hippocampal synaptic plasticity in an animal model of endogenous depression induced by neonatal clomipramine administration. Furthermore, we have also looked into the possible means of ameliorating depression induced cognitive deficits and anxiety. The first line of defense in depressive illness is antidepressant drugs. However, it is associated with poor response, side effects and recurrence of depressive episodes. Recent studies suggest that antidepressant response can be augmented by positive environments. Therefore, in this study we studied the effect of sub effective doses of either escitalopram (an SSRI) or reboxetine (an SNRI) combined with short duration of enriched environment (EE) on depression induced deficits. Our results demonstrate that depression is associated with impaired spatial learning and enhanced anxiety-like behavior which is correlated with hypotrophy of the dentate gyrus and amygdalar hypertrophy. We also observed a gross reduction in hippocampal long-term potentiation (LTP). In depressive rats subjected to concomitant escitalopram / reboxetine - EE treatment, we observed complete behavioral recovery with reduced indices of anhedonia and behavioral despair, reduced anxiety-like behavior and improved spatial learning along with a complete restoration of dentate gyrus and amygdalar volumes. The combination treatment also facilitated CA3-Schaffer collateral LTP. Our study proves convincingly that depression induces learning deficits and impairs hippocampal synaptic plasticity. It also highlights the role of restorative environmental stimuli in enhancing antidepressant response which might prove vital in outlining more effective strategies to treat major depressive disorders.

Our recent studies have demonstrated the cellular and molecular basis of fragile X mental retardation and autism in transgenic and knockout mouse models. The selective synaptic manipulation by

p21 activated kinase or metabotropic glutamate receptors ameliorated major symptoms of mental retardation and autism. This discovery led to the development of drugs to treat mental retardation and autism, which are in different stages of clinical trials. Thus, understanding the mechanisms of plasticity will provide an insight in developing new therapeutic strategies in treating neurological and psychiatric disorders. In spite of recent developments in novel research approaches and technologies, the clear understanding of the pathophysiological basis of complex brain dysfunctions is yet to emerge. Accordingly, it is becoming increasingly difficult and challenging to treat several brain disorders including cognitive deficits.

Invited Speakers
Biological Sciences

Dr. Prakash Halami
Chief Scientist, Professor-A
Head, Microbiology & Fermentation Technology
CSIR-Central Food Technological Research Institute

GRAS Microbes: Nutritional & Health Security of Future

In the search for sustainable solutions to global nutritional and health challenges, the focus has turned towards GRAS (Generally Recognized as Safe) microbes as a promising solution. Microbes are sustainable food resources of the future. Compared with animals and plants, microorganisms double their biomass very rapidly and are rich sources of protein (as high as 70% of the dry cell weight), vitamins, antioxidants and bioactive compounds. Generally Recognized as Safe (GRAS) microbes, recognized for their safety in food and pharmaceutical applications, offer promising avenues for addressing key challenges in nutritional and health security. Recent and ongoing developments in microbiome science are enabling new frontiers of research for GRAS Microorganisms. Several GRAS strains have a long history of safe industrial use such as Lactic Acid Bacteria (LAB)&Bifidobacteria. In addition to nutritional benefits, these GRAS organisms have numerous probiotic properties that support gut health, immune function, and overall well-being, paving the way for innovative functional food and pharmaceutical formulations.

LAB, which is a very popular GRAS organism are Gram-positive bacteria that are characterized by their production of lactate. Currently, oral agents containing LAB are popular probiotics owing to their physiological functions in balancing the gut ecosystem, antimicrobial and antiallergenic activities, and immunomodulatory properties. GRAS microbes play a pivotal role in enhancing food production and quality. Their ability to ferment and enhance nutrient bioavailability in various food matrices not only improves the nutritional content but also contributes to combating malnutrition and dietary deficiencies.

From Nutritional point of view, gamma-aminobutyric acid (GABA) which is a non-protein amino acid and are produced by a variety of GRAS organisms. This amino acid plays significant roles in neurotransmission, the sensations of pain and anxiety, protein synthesis in the brain. LAB with high GABA production that have been screened for fermentation include *Lactobacillu*s, *Lactococcus*, *Bifidobacterium*, and *Streptococcus*.

Similarly, exopolysaccharides derived from LAB are used extensively in the food and pharmaceutical industries. These EPS contribute significantly to the mouthfeel, flavor, texture, viscosity, and stability of dairy products, such as milk, yogurt, and cheese. Furthermore, they are beneficial to human health owing to their probiotic, antitumor, antiulcer, and immune properties.

On other hand, *Bacillus subtilis* is a well-characterized Gram-positive bacterium that has long been used as an industrial host to produce hydrolytic enzymes, amino acids and functional compounds and is widely used for soyabean fermentations. It has unique advantages for biochemical production owing to its wide range of substrates and strong synthetic capacity. Most importantly, *B. subtilis* is non-pathogenic and free of exotoxins and endotoxins. Thus, its products, particularly pharmaceuticals and nutraceuticals, meet GRAS requirements.

In addition*, Saccharomyces cerevisiae* is a traditional starter culture for pastries and wine, β-Carotene synthesis by *S. cerevisiae* has attracted increasing interest owing to the GRAS status. *Yarrowialipolytica* has great advantages in the production of organic acids and unsaturated fatty acids. *Spirulina* and other sea weeds are cultured commercially as a food supplement and have attracted increasing attention due to their abundant polysaccharides, phycocyanin's, minerals, essential vitamins, and fatty acids etc.

On the health front, GRAS microbes exhibit potential as biotherapeutics and probiotics. Their symbiotic relationship with the human gut microbiota offers a promising approach for improving digestive health, immune function, and overall well-being. All probiotics induce an immune response and increase the immunoglobulin A (IgA)-secreting cells in respiratory and gastrointestinal mucosae. Probiotics have drawn a lot of attention recently as a potential treatment to alter the microbe's positive effects on IBD. For instance, they have been utilized to treat ulcerative colitis and induce remission. Additionally, probiotics may offer an additional technique to standard therapy to treat diseases such as IBD and Crohn's diseases for future references.

In conclusion, the integration of GRAS microbes into diverse sectors ranging from food to healthcare holds immense promise in ensuring a sustainable and resilient future for nutrition and health security. However, some immense exploration and action is required towards harnessing the full potential of GRAS microbes as a milestone of future health and nutritional strategies.

The seminar will drive into our laboratory's recent research on numerous probiotic bacteria, including LAB, Bifidobacteria, and Bacillus species. These microbes play a crucial role in immune gut modulation and will be a focal point of discussion. Additionally, we will explore nutraceuticals derived from various seaweeds during the seminar.

Dr. S. Chandrashekaran
Chairman and Managing Director
Vipragen Biosciences Pvt Ltd

Researcher to Serial Entrepreneur: An accidental journey

This talk delves into the burgeoning field of cell and gene therapy, exploring the remarkable opportunities it presents for revolutionizing medical treatment. From curing genetic diseases to enhancing immune responses against cancer, these therapies hold immense promise.

Leveraging cutting-edge technologies like CRISPR-Cas9 and viral vectors, researchers are pushing the boundaries of what's possible in treating previously incurable conditions. However, alongside these opportunities come significant challenges, ranging from technical hurdles to ethical considerations and regulatory frameworks. Understanding and addressing these challenges is crucial for realizing the full potential of cell and gene therapy in transforming healthcare."

Invited Speakers

Chemical Sciences

Dr. Naresh Nalajala
Assistant Professor
Department of Materials Science and Catalysis
Poorna Prajna Institute of Scientific Research
(PPISR)

Shape Can Serve the Survival: A Journey Through Catalytic, Electrocatalytic, and Photocatalytic Applications

Shape-controlled nanoparticles (NPs) are of immense scientific and technological importance in the fields of catalysis, medicine and energy because of their unique facet-dependent chemical and physical properties. They are usually surface-terminated by a few select low-index crystallographic orientations, typically {111}, {100} and {101}. The surface energies of these orientations, those decide the properties of the nanoparticles, are entirely different. This is evident from the investigations on the crystallographic orientation-dependent reaction kinetics with well-defined single crystal surfaces. But well-defined single crystal surfaces are model systems and efforts are therefore made to translate the findings to bulk nanomaterials of practical importance. Thus, the manipulation of the shape of the nanoparticles is an emerging area of research, but, their nucleation and growth mechanisms are still not well understood. In view of this, the presentation will unveil the underline basics of particle formation, shape evolution of nanoparticles (Pd, Pt, Au, Ag etc.), importance of impurity removal, and relevance towards different (catalytic, electrocatalytic and photocatalytic) applications.

Dr. Neena
Scientist E
Centre for Nano and Soft Matter Sciences
(CeNS)

Metal oxide based electrocatalysts for hydrogen generation

Electrocatalytic and photocatalytic conversion of water for hydrogen production are of great significance to a clean and sustainable environment. Water splitting and urea-assisted hydrogen generation from water are the two major emerging areas for achieving clean energy and environment remediation. Transition metal oxides have gained popularity as catalysts as they are earth abundant and less expensive that precious noble metals. Furthermore, their properties such as optical absorption, band gap, conductivity and active sites can be heavily tuned by defect and surface engineering and interfacing with other semiconductors, metal nanoparticles, carbon nanomaterials, etc, suitably. The efforts going on in our lab towards design and understanding of metal oxides for catalytic hydrogen generation will be discussed. Electrochemical activation of MoO_2 catalysts shows enhanced hydrogen evolution with less onset potential in acidic medium. A detailed investigation reveals intermediate lower oxidation states of Mo- ion and a structural distortion towards tetrahedral coordination during activation favours the observed enhancement [1]. In the case of urea-assisted electrolysis (UOR), nickel oxide catalysts possessing high valent Ni ion facilitating enhanced NiOOH active site formation with better COxpoison tolerance provide high activity and stability [2-3]. Mixed metal oxides containing a combination of Ti, Zn and Cu oxide shave shown better photocatalytic hydrogen generation and pollutant degradation efficiency than the individual constituents.

Invited Speaker
Physical Sciences

E. Parasuraman
Assistant Professor-Senior Grade-I
Department of Physics, School of Advanced Sciences,
Vellore Institute of Technology, Tamil Nadu

Dynamics of waves in ferromagnetic spin chains

Magnetism, one of the earliest recognized physical phenomena, remains an interesting area for technological advancements due to its diverse array of exotic phenomena. Recently, researchers have been exploring various theoretical and experimental methods to study the excitations in magnetic materials, considering different magnetic interactions such as biquadratic exchange, anisotropic interaction, and dipole-dipole interaction. However magnetic interactions in ferromagnetic spin chains are catching the interest of many researchers because of their importance in storage applications. In the ferromagnetic spin system, nonlinear spin-spin interactions play a crucial role in generating nonlinear excitations like spin-wave excitations and magnetic solitons. Understanding the dynamics of these nonlinear excitations is important for potential applications in communication systems and nonlinear signal processing devices. Among various interactions, Dzyaloshinskii-Moriya interaction (DMI) is particularly significant as it was found to be the driving force to stabilize various novel topological noncollinear magnetic structures, such as spin spirals, magnetic skyrmions, magnetic soliton lattices and so on. DMI arises from asymmetric spin coupling due to insufficient symmetry around magnetic ions. DMI also holds promise for applications in quantum computing by serving as a basis for entanglement and construction of quantum computers.

In 2019 we investigated the modulational instability (MI) of localized modes within discrete quantum ferromagnetic spin chains, examining the impact of impurities. Very recently, we investigated the collision of perturbed solitons within discrete ferromagnetic spin chains, considering the influence of both nearest neighbour and next nearest neighbour Dzyaloshinskii-Moriya (DM) interactions. Through these investigations, a comprehensive understanding of the dynamics of spin waves in ferromagnetic spin chains is gained, along with insights into their potential applications in storage devices. We aim to provide a comprehensive overview of the dynamics of waves in ferromagnetic spin chains, offering insights into their fundamental properties and technological implications.

Mr. Dinesh Badagandi
Founder and CEO,
Varnaaz Technologies Pvt Ltd.

Bridging the Gap: Empowering Rural India Through Science Education

In the wake of the IT revolution and the remarkable achievements of organizations like the Indian Space Research Organisation (ISRO), India has emerged as a global power in the 21st century. Yet, despite this transformative journey, there remains a significant gap in the dissemination of progress to the farthest corners of the nation, particularly in rural areas. While urban centers thrive with access to modern amenities and educational resources, the rural populace continues to grapple with limited opportunities and resources. This talk delves into the pivotal role of learning infrastructure, such as science centers and planetariums, in nurturing the innate curiosity of children and igniting their aspirations. These centers serve as beacons of knowledge, inspiring young minds to dream beyond the confines of their immediate surroundings. However, the reality is stark: more than 200 million students in rural India are deprived of the opportunity to experience the wonders of science firsthand. The discussion will focus on strategies to bridge this gap and extend the benefits of science education to every corner of rural India. It will explore innovative approaches to reach the last mile, ensuring that no child is left behind in the pursuit of knowledge and empowerment. From leveraging technology to establishing mobile science labs, the talk will examine various initiatives aimed at democratizing access to quality education.

Furthermore, the session will underscore the transformative impact of empowering rural youth with scientific knowledge. By equipping them with the tools to explore, innovate, and problem-solve, we not only enrich individual lives but also fuel the engine of national progress. From nurturing future scientists and engineers to fostering critical thinking skills, science education serves as a catalyst for socio-economic development and inclusive growth. Through real-life examples and success stories, this talk will inspire stakeholders from diverse backgrounds to join hands in the noble mission of uplifting rural education. It will emphasize the collective responsibility of government bodies, educational institutions, NGOs, and corporate entities in creating a conducive ecosystem for learning and discovery. In essence, the discussion aims to spark dialogue, foster collaboration, and chart a roadmap towards a future where every child in rural India has the opportunity to explore the wonders of science and realize their full potential. By reaching the last mile, we not only transform individual lives but also pave the way for a brighter, more inclusive future for the nation as a whole

CONFERENCE THEMES

1. Biological Sciences

Beneficial microbes - BBM

Cell and Gene Therapies - BCG

Biotherapeutics and Nano-biomaterials - BBN

Waste reduction and Management - BWM

Omics technologies - BOT

Bioinformatics and computational biology - BBC

2. Chemical Sciences

Polymer and Macromolecular Chemistry -CHPM

Energy Materials - CHEM

Nanotechnology - CHNT

Advanced Structural Materials and Processing - CHAP

Environment and Sustainable Green Synthesis - CHEG

Organic Synthesis and Catalysis - CHOC

3. Physical Sciences

Bio-Mechatronics - PBA

Computer Vision - POT

Cyber security and Block Chain Technology -PCB

AI & Machine Learning - PAM

Mathematical modelling and application - PMA

Computational Fluid Dynamics - PCD

Biological Sciences Abstracts

BBM-OP-01

Antagonistic Effect of 1-MCP and Chitosan on Spoilage and Shelf-Life Extension in Avocado Fruit (*Persea Americana* Mill.) During Storage

Vittal Kamble*, C. K. Narayana, D. V. Sudhakar Rao, G. Karunakaran, Laxman R. H. and Sriram S.

ICAR - Indian Institute of Horticultural Research, Hesaraghatta lake post, Bengaluru - 560 089

***Corresponding Email: vittahort@gmail.com**

Avocado (*Persea americana* Mill.) fruit gaining more popularity among the growers, consumers and traders due to its high nutritional value, more health benefits and increased international trade. Shelf life of the avocado fruit is very limited because of its climacteric nature and high rate of respiration and spoilage. The aim of present study was to investigate the effect of 1-methylcyclopropene (1-MCP, 500ppb) and chitosan (0.5 %) on avocado fruit spoilage and shelf-life enhancement in cold storage (9 ˚C with 90-95 % RH) and ambient condition (25-32 °C and 50-55 % RH). The results showed that significantly lower fruit spoilage, physiological loss in weight (PLW), ripening rate, respiration and ethylene production rate, and higher carbohydrates, protein and crude fat content was recorded in fruits treated with 1-MCP followed by chitosan under both the storage conditions. This study also revealed that 1-MCP treatment had greater impact on reducing microbial spoilage and extended the shelf life up to 14 and 42 days at ambient temperature and cold storage respectively, with maxim um retention of fruit quality. Chitosan treatment also recorded a storage life of slightly over 28 days at 9 °C and 10 days in ambient temperature with minimum spoilage as compared to control. From this study it is concluded that both 1-MCP and chitosan are validated as non-toxic and eco-friendly which can be used as most effective and potential alternative for fungicides to control decay and to extend the shelf life of avocado fruits during storage.

Keywords: 1-methylcyclopropene (1-MCP), Chitosan, Fruits, Shelf life, Spoilage, Storage.

BBM-OP-02

Antibiofilm Activity of *Artocarpus Heterophyllus* and *Mangifera Indica*

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Plant extracts (*A. heterophyllus* and *M. indica*) were tested for their antibacterial activity against the three isolates i.e., *E. coli, Klebsiella* spp. and *S. aureus*. Methanol, ethanol, and water were the three solvents used to make extracts of *A. heterophyllus* seed, *A. heterophyllus* pulp, *M. indica* seed, *M. indica* pulp and M. *indica* peel, which showed different inhibitory zones ranging from 5 to 24 mm. Biofilm inhibition assay was done using a 96-well microtiter plate. The ethanolic extract of *M. indica* seed showed to be effective in inhibiting the biofilm created by *E. coli*. whereas methanolic extract of *M. indica* peel showed to be least effective against the biofilm formed by *E. coli*. Against *Klebsiella* spp. methanolic extract of *M. indica* seed showed to be effective in inhibiting the biofilm. Whereas ethanolic extract of *M. indica* pulp showed to be least effective against the biofilm formed by *Klebsiella* spp. Against *S. aureus* methanolic extract of *M. indica* seed showed to be effective in inhibiting the biofilm. Whereas ethanolic extract of *M. indica* pulp showed to be least effective against the biofilm formed by *S. aureus*. The ethanolic extract of *M. indica* peel had the highest activity in eradicating the biofilm formed by *E. coli.* Whereas the ethanolic extract of *M. indica* pulp showed to be the least effective in eradicating the biofilm formed by *E. coli.* The methanolic extract of *M. indica* pulp had the highest activity in eradicating the biofilm formed by *Klebsiella* spp. The least eradicating power was showed by ethanolic extract of *M. indica* pulp against biofilm formed by *Klebsiella* spp. The ethanolic extract of *M. indica* seed showed to be highest effective in eradicating the biofilm formed by *S. aureus*. The least eradicating power was showed by methanolic extract of *M. indica* peel against biofilm formed by *S. aureus*.

Keywords: *Artocarpus heterophyllus*, *Mangifera indica*, Biofilm inhibition, Biofilm eradication

BBM-OP-03

Antimicrobial assay from *Annona muricata*

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Annona muricata also known as soursop is a plant belonging to the Annonaceae family, which comprises more than 130 genera and 2300 species.

The two soursop leaves from different place were collected and subjected for maceration using two different solvents namely Ethanol and Methanol. These extracts were identified with containing active components such as This plant is widely grown in tropical and subtropical areas. The plant produces edible fruits and leaves which has various pharmacological activities. The extracts of the leaves are fascinating for study for their various economic benefits and is gaining attention for application.

One of main threat is that the organisms are becoming resistance to various chemical drugs and this in variably effects the health of the people. Presently, the use of natural ingredients as treatment for various disease is increasing. The compounds present in plants are responsible for their activities against various diseases.

Our project aims to analyze the antimicrobial properties of the soursop against different pathogenic microorganism. flavonoids, terpenoids, acetogenins, alkaloids, glycosides, tannins. Further the extracts were subjected for agar diffusion methods which was inoculated with different pathogenic organisms to determine their resistance or sensitivity towards these extracts.

Assessment of the resistance and sensitivity of different organisms towards these extracts which may balance quality, effectiveness, toxicity to that of modern drugs, then commercialization of these extracts is quite likely.

Key Words: Soursop, Pharmacological, Metabolites, Drug, Resistance,

BBM-OP-04

Beneficial Microbes the Role of Bacteria in Cancer Therapy

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Currently, bacteria have progressively been treated to be a encouraging podium for cancer therapy credit to their many unique properties, such as distinct tumor-targeting ability, immense motility, immunogenicity, and their use as gene or drug carriers. Engineered bacteria have been eqvipped with the controllable expression of therapeutic proteins. Meantime nanomaterials have been universally used to transform bacteria for targeted drug distribution, photothermal therapy, magnetothermal therapy, and photodynamic therapy, while promoting the antitumor productivity of collaborative cancer therapies.

However, the desirable cytotoxicity impacts of bacteria, their incompetence to completely distruct cancerous cells, as well as the probability of mutations in their genomes are among the significant challenges of bacteria-based means for cancer treatment.Numerous adverse and side effects, low specificity and sensitivity, narrow therapeutic windows, and, recently, the emergence of tumor cells resistant to such treatments have been authenticated as the drawbacks of general treatment approaches. As a group of prokaryotic microorganisms, bacteria have great potential for use in cancer therapy.

Successful treatment of cancer remains a challenge, due to the exclusive pathophysiology of solid tumors, and the foreseeable evolution of resistance. Traditional methods for cancer therapy including radiotherapy, chemotherapy, and immunotherapy all have their own limitations. A novel approach is bacteriotherapy, either used alone, or in combination with conventional methods, has shown a positive effect on regression of tumors and inhibition of metastasis. The bacteria like *Bacillus* spp., *Clostridium* spp., *E. coli, Listeria* spp., and *Salmonella* spp. can be reprogrammed to produce, transport, and deliver anticancer agents, eg, cytotoxic agents, prodrug converting enzymes, immunomodulators, tumor stroma targeting agents, siRNA, and drug-loaded nano formulations based on clinical requirements. acted by the ‘genetic makeup’ of a tumour. Several genera of facultative and obligate anaerobic bacteria, such as *Clostridium*, *Bifidobacterium*, Salmonella, *Escherichia*, *Proteus*, and *Lactobacillus*, have been extensively studied because of their ability to specifically target and inhibit tumor growth.

Keywords: Anaerobic Bacteria, Cancer Therapy, Traditional Method,

BBM-OP-05

Comparative Analysis of Antibiotic and Antimicrobial Peptides from Silkworm *Bombyx mori* (L) Haemolymph Plasma: Effectiveness Among Various Bacterial Strains Without Purification of AMPs

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In this study, we explore the inherent antimicrobial properties present in the haemolymph plasma of the silkworm *Bombyx mori* (L), focusing on its efficacy against various bacterial strains without isolating or purifying specific antimicrobial peptides (AMPs). The haemolymph, a vital component of insect immune defence, contains a diverse array of molecules, including AMPs, which play a crucial role in combating microbial invaders. Our approach aims to assess the collective antimicrobial activity of the haemolymph plasma, reflecting the natural defence mechanisms of the silkworm. We employ a range of bacterial strains representing clinically relevant pathogens, including Gram-positive and Gram-negative bacteria, to comprehensively evaluate the broad-spectrum efficacy of the haemolymph plasma. Through standardized antimicrobial assays, we measure the inhibitory effects of the plasma on bacterial growth, comparing its performance to conventional antibiotics. By analysing the differential responses of various bacterial strains to the haemolymph plasma, we gain insights into its potential as a source of novel antimicrobial agents. Furthermore, by circumventing the purification process of AMPs, our study offers a pragmatic approach for harnessing the antimicrobial properties of insect haemolymph in the development of alternative therapeutic strategies against antibiotic-resistant pathogens.

Keywords: *Bombyx mori* L, Haemolymph, Plasma, Anti-microbial peptides (AMPs), antibiotic resistance.

BBM-OP-06

Degradation of Polyethylene Terephthalate by *Trametes hirsuta*

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Plastic pollution is a pressing environmental concern, demanding urgent adoption of eco-friendly solutions. Fungal degradation has emerged as a promising avenue to address this crisis. This study investigates the enzymatic degradation of Polyethylene Terephthalate (PET) plastic by *Trametes hirsuta*, a white rot fungus known for its natural degrading capabilities. While specific enzymatic pathways remain partially understood, our findings suggest the involvement of PETase, lipase, cutinase, laccase, esterases, oxidases, and peroxidases. These enzymes catalyze key reactions in plastic breakdown, utilizing its carbon-rich structure as a substrate. Understanding these enzymatic mechanisms is pivotal for formulating effective strategies to combat pollution. By elucidating the enzymatic pathways involved in PET plastic degradation, this research not only offers practical insights into waste management but also underscores the importance of harnessing natural processes to preserve our environment for future generations. Through enzymatic breakdown, fungi offer a sustainable and eco-friendly alternative to traditional plastic disposal methods. This research contributes valuable insights into the enzymatic pathways involved in plastic degradation, paving a way for the development of innovative solutions to mitigate plastic pollution and preserve environmental health for future generations.

Keywords: Trametes hirsuta, Plastic degradation, PETase, Lipase, Laccase, Polyethylene Terephthalate,

BBM-OP-07

Development, Formulation, and Nutritional Analysis of Fat-Replaced Ice Cream Enriched with *Bifidobacterium Bifidum* and *Lactobacillus Casei*

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Probiotic ice cream is one of the methods in improving the benefit and functional value of common ice cream. This study focused on developing functional ice cream by replacing fats with whey protein isolate, tapioca starch, and maltodextrin. Twenty formulations were carried out to reduce the fat content significantly. Among twenty formulations, three formulations (T1, T2 and T3) were used for incorporating probiotic cultures such as *Lactobacillus casei*, and *Bifidobacterium bifidum* into ice cream before ageing. The results showed that the developed probiotic ice creams had fat reductions of up to 4% in maltodextrin (T1), 5% in Whey Protein Isolate + Maltodextrin (T2) and 5% in tapioca starch (T3). Similarly, the carbohydrate in T1 showed 22.7%, in T2 22.44% and in T3 21% and the protein content was found to be 7.39% in T1, 7.29% in T2 and 8.21% in T3 respectively. Further, the developed ice creams showed significant nutritional properties with respect to macronutrient and micronutrient composition, whereas the microbiological analysis showed probiotic viability and product safety. Sensory evaluation of the product was done and it was found to be slightly more acidic than the control. These findings contribute to the scientific understanding of functional food development and offer insights for consumers and the food industry. In incorporating probiotics into ice cream addresses the increasing demand for gut health-promoting products, aligning with consumers' preferences for healthier options without sacrificing taste. This research showcases the potential to combine health-promoting ingredients with traditionally indulgent treats, appealing to health-conscious consumers and enhancing market appeal for ice cream manufacturers. Overall, this study advances the development of healthier dessert options that meet consumer demands for both taste and health benefits in frozen treats. Further, the study is required to ascertain its shelf-life properties.

Keywords: Ice cream, Fat replacers, Probiotics, Nutritional analysis, Sensory evaluation.

BBM-OP-08

Exploring Quorum Quenching Potential in Lactic Acid Bacteria Against *Enterococcus faecalis.*

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The oral cavity harbours more than 500 species of bacteria, with dental caries being a common chronic infection worldwide. Acids produced by certain bacterial species in response to carbohydrates can lead to the formation of cariogenic plaques, causing tooth decay and pain. *Enterococcus faecalis*, a Gram-positive bacterium, has been implicated in dental infections and endodontic failures due to its ability to survive in hostile environments and inhibit immune responses. *E. faecalis* possesses virulence factors such as gelatinase, cytolysin, aggregation substance, and collagen binding protein, enabling it to adhere to host tissues and form biofilms. Despite being susceptible to antibiotics, enterococci can develop resistance and form biofilms, complicating treatment and leading to recurrent infections with a high mortality rate.

Various approaches in dentistry, such as calcium hydroxide and sodium hypochlorite tests, as well as antibiotic paste assays, are utilized to combat biofilm-associated infections caused by *E. faecalis*. Probiotic bacteria have been shown to have health benefits, including immunomodulation and anti-cancer properties, and may be a potential alternative for treating bacterial infections. In this study, extracts from lactic acid bacteria isolated from fermented sources were found to effectively inhibit the biofilm formation of *E. faecalis* from tooth samples. This suggests that lactic acid bacterial extracts could be developed into treatments for root canal infections caused by *E. faecalis*. Further research is needed to explore the potential of probiotic strains in combating bacterial infections and addressing antibiotic resistance concerns in dental care.

Keywords: Dental caries, E. faecalis, Virulence factors, Biofilms, Probiotics

BBM-OP-09

Isolation and Screening of Keratinolytic Bacteria from Poultry Feather Dumped Soil

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Human civilization, with its numerous activities, results in the accumulation of huge amounts of solid wastes in the environment. With the expansion of human population, disposal and management of solid waste is becoming one of the major alarms faced by humanity.Even though various methods of disposal such as burying, incineration or disposing it in the specified locations have been devised to reduce the quantity of keratin waste generated annually, a significant amount of it is still created globally. Feathers, hair, horns, nails and hooves are examples of keratin wastes that are mostly produced from animal body parts and as waste from industrial processes, primarily from butcher shops, chicken farms and leather industry. These wastes accumulate in the ecosystem and are regarded as pollutants which increases the likelihood of environmental danger. For instance, an estimated 40 million tonnes of these waste feathers are burnt annually spewing out sulphur dioxide and carbon dioxide in the process. Under mild circumstances, keratin proteins are difficult to solubilize because they are biochemically inert biomaterials. This is because keratin components have a high number of disulphide bonds between cysteine amino acids. Consequently, it is challenging for typical proteolytic enzymes (trypsin, pepsin) which are primarily derived from plant sources to fully break down keratin into smaller components. Most reports suggest that bacteria and their enzymes are responsible for the whole breakdown of keratin wastes. Biodegradation of keratin wastes by keratinophilic microorganisms, and their enzymes (keratinases) overcomes the drawback observed by chemical and thermal treatment. The aim of this study was to isolate and screen keratinolytic bacteria from soil where poultry wastes are dumped, with the potential for applications in bioremediation. Soil samples were collected from areas surrounding poultry farms where feather waste was excessively discarded. The samples were processed and inoculated onto selective media (Feather meal agar) containing keratin as the sole carbon source. Isolated bacterial colonies exhibiting growth and clear zones of feather degradation were selected. A total of 13 bacterial isolates were taken forward for further studies. These isolates were capable of degradation of feathers in 20 days of incubation.Morphological and biochemical characterization was carried out for the selected isolates. Morphological characterization included Gram staining and biochemical tests of the isolates led to their identification as Bacillus spp, Buttiauxella spp, Shigella spp, Proteus spp, Kluyvera spp, Alcaligenes spp, Pseudomonas spp and Ochrobactrum spp. Thus, these novel keratinolytic bacterial isolates have potential use in processes involving keratin hydrolysis.

Keywords: Keratinolytic bacteria, Skimmed milk agar, Feather meal agar, Bioremediation.

BBM-OP-10

Microencapsulation of *Lactobacillus acidophilus* for Incorporation in Flax Seedcream Biscuits

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The study focuses on addressing global challenges on malnutrition and finding a cure through the development of a fortified cream biscuit enriched with flax seed flourand microencapsulated probiotics. In this study, the comprehensive evaluation included proximate analysis, sensory analysis and assessment of antioxidant properties in fortified cream biscuit. The fortified biscuit exhibited commendable nutritional content with significant levels of moisture (4.73±0.07%), ash (10.8±0.05%), fat (17.2±0.09%), protein (20.89±0.04%), crude fiber (8.5±0.08%), iron (7.2±0.02%), and carbohydrates (45.91±0.03%), along with a high total energy content (440.45±0.05 Kcal/g). Furthermore, its antioxidant properties were notably enhanced, indicating potential health benefits. Microencapsulated probiotics present in cream, analyzed via SEM and viability tests exhibited favorable characteristics and demonstrated resistance to pH and bile salts. Sensory evaluation confirmed the superiority of the fortified biscuit in terms of flavor, color, and overall acceptability. Importantly, during shelf life analysis the probiotic viability remained above 7 Log CFU/g even after 10 weeks of storage. This research suggests the feasibility of incorporating probiotic bacteria into dry matrices for fortified food products, offering a promising avenue to combat global food insecurity, hidden hunger, and gastrointestinal disorders. By harnessing the potential of microencapsulation technology and organically sourced ingredients, our fortified cream biscuit presents a practical and effective solution to enhance human health and development, particularly in regions facing nutritional challenges.

Keywords: Microencapsulated probiotics, *Lactobacillus acidophilus*, Proximate Analysis, Antioxidant Studies, Sensory analysis.

BBM-OP-11

Mucor janssenii and *Cladosporium cladosporioides* as Potential Oleaginous Fungi for Biodiesel Production

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Fungi from different soil samples were isolated and identified as *Aspergillus, Penicillium, Mucor, Cladosporium, Rhizopus and Fusarium* based on the colony characteristics and staining techniques. The isolated fungi were cultivated on potato dextrose broth at standard conditions. Fungi such as *Aspergillus, Cladosporium, Penicillium* and *Mucor* showed good to moderate growth, *Fusarium* showed very less growth and *Rhizopus* did not show any growth under the given conditions. The fungal biomass was further separated from the broth and dried at 40^0C. The lipids were extracted from the dried fungal biomass and were subjected to biodiesel production through transesterification process. The biodiesel thus obtained were subjected to Gas Chromatography Mass Spectrometry (GCMS) analysis which indicated the presence of Fatty Acid Methyl Esters (FAME) such as Methyl palmitate, Methyl linoleate, and Methyl Palmitelaidate. In addition Methyl (Z)-5,11,14,17 eicosatetraenoate (2.41%) was found only in *Mucor* species. Of the four selected fungal species, *Mucor* showed high percentage of Methyl oleate (42.87%) and *Cladosporium* showed increased percentage of Methyl plamitate (28.82%), Methyl Palmitelaidate (18.64%) and Methyl stearate (16%). Further *Mucor* and *Cladosporium* were subjected to molecular identification through ITS Sequencing and were identified as *Mucor janssenii* and *Cladosporium cladosporioides.* These two oleaginous fungal species can be considered as a sustainable alternative for fossil fuels in future.

Keywords: Oleaginous fungi, Gas Chromatography Mass Spectroscopy (GCMS), Biodiesel, Fatty acid methyl esters (FAME).

BBM-OP-12

Plant Virus Detection: Fortifying Agricultural Resilience and Yield Security

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Plant viruses pose a significant threat to worldwide agriculture, leading to substantial economic losses and endangering food security. Rapid and accurate detection of plant viruses is crucial for timely disease management and mitigation strategies. This review provides an overview of the latest advancements in plant virus detection methods, encompassing both traditional and emerging techniques. Conventional methods such as serological assays, electron microscopy, and host indexing are discussed alongside their limitations and challenges. Moreover, the advent of molecular techniques including polymerase chain reaction (PCR), reverse transcription PCR (RT-PCR), real-time PCR, loop-mediated isothermal amplification (LAMP), and nucleic acid sequencing has revolutionized plant virus diagnostics, enabling sensitive and specific detection even at low virus concentrations. Furthermore, recent developments in high-throughput sequencing technologies have facilitated the identification of novel and complex viral pathogens, offering valuable insights into viral diversity, evolution, and epidemiology. Additionally, advancements in nanotechnology, biosensors, and imaging technologies have led to the development of rapid, portable, and point-of-care diagnostic platforms for on-site virus detection in field settings. These new diagnostic methods make it easier and faster to detect virus diseases in plants for surveys, studies, quarantine, seed certification, and breeding. This review critically evaluates the strengths and limitations of existing detection methods, explores prospects for enhancing sensitivity, specificity, and throughput, and emphasizes the importance of integrated approaches for effective plant virus surveillance and management in agricultural systems.

Keywords: serological, biosensor, electron microscopy, virus management, PCR

BBM-OP-13

Screening and Characterization of Bioactive Compounds Isolated from *Origanum majorana* treated with *Glomus mosseae* and *Glomus fasciculatum*

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Medicinal plants have assumed greater importance in recent years due to their tremendous potential in modern and traditional medicine. Most of the medicinal plants have relatively less side effects or no adverse effects on the health of human beings. Arbuscular Mycorrhizae (AM) fungi are associated symbiotically with higher plants and are known to enhance the constituents in them and aid in increased uptake of mineral nutrients by the plants. The current study, used two species *Glomus mosseae* and *Glomus fasciculatum* of the Glomus, most significant genus of VAM fungi. The *Origanum majorana* was collected from Indian Institute of Horticultural Research (IIHR) and pure culture of AM fungi was used for pot inoculation of the selected plants. The test plants along with the control plants were watered for 30, 60 and 90 days. The plant materials were shade dried completely and powdered. Using methanol as a solvent by the Soxhlet extraction method, the extract were obtained and tested for Qualitative and Quantitative analysis of phytochemicals by standard methods. It was found that alkaloids, flavonoids, phenols, quinones, saponins, tannins, terpenoids, cardiac glycosides, and carbohydrates were present. The AM treated plant samples showed increased concentrations of phytoconstituents than compared to untreated control plants. Simultaneously antimicrobial activity was also conducted to check the activity against the selected bacteria and fungi collected from MTCC. The extracts from AM fungi treated plants showed more activity than compared to control plants. GCMS, HPLC, FTIR and NMR studies confirmed the presence of the bioactive compound Azulene which played a vital role in preventing the growth of some pathogenic test microorganisms.

Keywords: *G. mosseae*, *G. fasciculatum*, antimicrobial activity, *Origanum majorana*, GCMS, HPLC, FTIR and NMR.

BBM-OP-14

Vertical Acres - An Urban Option for Sustainable Nutritional Security

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Due to escalating population, urbanization and subsequent diminution of cultivable agricultural land area, much of the agricultural area is devoted to food grain production with only a lesser proportion for horticultural crops. However, there is a rising urge to assure nutritional security apart from satiating the mounting food demand. Horticultural crops are good source of vitamins, minerals and anti-oxidants. Hence, the better solution for intensifying the horticultural productivity is to involve the infinite vertical acres into cultivation. Even the protected cultivation technology does not fully exploit the potential of the polyhouse structures by leaving the vertical space unutilized. Plant density, productivity and net returns could be drastically increased by adopting the special vertical modules designed with appropriate angle and dimensions as uniform light exposure is the key factor in enhancing the crop performance. Moreover, light could be regulated by using artificial lighting system or reflectors to ensure uniform growth and quality. Crops like strawberry, amaranthus, pak choi, lettuce, other leafy vegetables, tomato, brinjal, okra, potato, turmeric, ginger, gerbera, gypsophila, lilium, gladiolus, orchids, etc. As per a study conducted in 2020, it was found that the profit earned from vertical farming is 3640 % while, it was 644 % in horizontal farming per ha though the initial investments are higher in case of vertical farming (Rs. 79,69,327). In addition, use of soil-less substrate is advisable in vertical farming as it could prevent the structure collapse and extend its durability. Different hydroponic or soil-less system such as deep flow technique, nutrient film technique and aggregate wick system are gaining popularity nowadays due to their greater water and nutrient use efficiency. Experiments are already being conducted worldwide to standardize the vertical module, lighting system, nutrition and substrate to acquire the complete benefits of vertical farming system. Thus, vertical hydroponics could be highly remunerative to the urban and peri-urban community to sustain horticultural production by realizing huge productivity and net benefits.

Keywords: Hydroponics, Protected Cultivation, Soil-less system, Urban farming, Vertical farming.

BBM-OP-15

Evaluation of Antimicrobial Potential of Lactic Acid Bacterial Isolates of Sweet Corn (*Zea mays* L. *saccharata*)

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Sweet corn (*Zea mays* L. *saccharata*), is one of the most popular cereals. The high moisture, soluble sugars and microbiota of sweet corn greatly reduce marketability of the produce. The lactic acid bacteria naturally associated with sweet corn cobs were evaluated for their antimicrobial potential and their effectiveness in controlling spoilage of sweet corn was studied. The epiphytic and endophytic lactic acid (LA) bacteria (27), spoilage bacteria (10) and fungi (7) were isolated using de Man, Rogosa and Sharpe (MRS) Agar, Nutrient Agar and Martin's Rose Bengal Agar media respectively from sweet corn kernels cultivated at Rajanukunte and Devanahalli. The spoilage bacteria and fungi were isolated from spoiled cobs (SB and SF). A preliminary *in vitro* screening of LA bacterial isolates for their antibacterial and antifungal activity was carried out using agar well and agar plug method respectively. The isolates LAB-1, LAB-2, LAB-4, LAB-18 and LAB-22 exhibited the highest inhibitory activity against spoilage microorganisms. Further, the isolates were reconfirmed for their antimicrobial potency along with a reference culture *Lactobacillus acidophilus* NCIM 2903. The three best LA bacterial isolates *viz*., LAB-4, LAB-18 and LAB-22 exhibited potential antimicrobial activity against spoilage microorganisms. The selected isolates were assessed for compatibility with each other. The compatible isolates were tested for their synergistic effects *w.r.t.* inhibition of spoilage microorganisms. The isolates, LAB-18 and LAB-22 synergistically inhibited fungi in terms of biomass with 76.00 and 72.57 % against SF-3, SF-1 and with an inhibition area of 10.20 and 9.96 cm^2 against SB-6 and SB-7 respectively. The 16S rRNA gene sequence of LAB-18 and LAB-22 were determined and identified as *Lactiplantibacillus pentosus* UASBMIC_18 and *Lactiplantibacillus plantarum* UASBMIC_22 respectively. This research highlights the potential of harnessing indigenous LA bacteria present in the natural environment of fresh sweet corn to preserve them through biopreservation methods.

Keywords: Sweet corn, Lactic acid (LA) bacteria, Spoilage microorganisms, Antimicrobial potential.

BBM-OP-16

Synergistic Effects of Arbuscular Mycorrhizae and Plant Growth Promoting Rhizobacteria on *Catharanthus roseus* (L.) G. Don Growth Parameters

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Catharanthus roseus (L.) G. Don, a renowned medicinal herb from the apocynaceae family, is valued for its therapeutic properties. In pursuit of sustainable agricultural practices, this study investigates the potential of Arbuscular Mycorrhizae (AM) and Plant Growth Promoting Rhizobacteria (PGPR) as alternatives to conventional fertilizers. The experiment, conducted under polyhouse conditions, explores the effects of AM fungi (*Acaulospora laevis* and *Glomus mosseae*) and *Pseudomonas fluroscenses,* individually and in combinations, on various growth parameters of *Catharanthus roseus.*

After 120 days of inoculation, significant improvements were observed in growth parameters with the application of AM inoculum and *P. fluorescens*. The consortium of *G. mosseae*, *A. laevis*, and *P. fluorescens* emerged as the most effective, leading to increased shoot height, root length, leaf area, biomass, percent root colonization, and AM spore numbers. Furthermore, enhancements in chlorophyll content, phosphorous levels, and phosphatase activities were noted with the combined application of AM fungi and *P. fluorescens.*

The study encompassed several objectives, including the isolation and identification of PGPR from *Areca catechu* rhizosphere soil, characterization of PGP traits, isolation, and mass production of mycorrhiza, and examining the synergetic effects of PGPR and mycorrhiza on *Catharanthus roseus.*

Soil samples were collected from different sites in Shivamogga district, and physico-chemical properties were analyzed. PGPR were isolated, characterized biochemically, and subjected to molecular analysis for identification. Mycorrhizal spores were isolated, quantified, and identified, with Acaulospora sp. selected for mass cultivation.

The synergetic effect of PGPR and mycorrhiza on *Catharanthus roseus* was evaluated under greenhouse conditions, demonstrating significant growth responses. The combination of PSB with AM fungi exhibited the highest growth compared to control groups.

This study sheds light on the potential of AM fungi and PGPR as sustainable alternatives for enhancing the growth and productivity of medicinal plants like *Catharanthus roseus*, offering promising avenues for eco-friendly agricultural practices.

Keywords: *Glomus mosseae*, *Pseudomonas fluorescens, Catharanthus roseus*, leaf area, Phosphatase activities.

BBM-PP-01

A Review Study on the Enhanced Production of Alkaline Protease Using Genetic Engineering Techniques in *Bacillus Amyloliquefaciens.*

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This review paper synthesizes current knowledge regarding the enhanced production of alkaline protease by introducing the BSP-1 gene in *Bacillus amyloliquefaciens*. Alkaline protease, found in all living organisms, serves a variety of functions, and is widely applied in detergents, food, textile, leather, pharmaceutical, and other industries. However, the current activity and yield of alkaline protease cannot meet the high demand. Therefore, it is important to identify novel methods to synthesize alkaline protease with high activity.

The BSP-1 gene was isolated from *Bacillus subtilis* due to its significant attributes such as fast growth and development, strong metabolic capacity, and rich by-products. *Bacillus subtilis* has been the preferred organism for industrial production of a variety of products.

In this review, a promoter, terminator, and the alkaline protease BSP-1 gene were fused to form a recombinant gene. Subsequently, the recombinant gene was incorporated into the pHY-300PLK plasmid to obtain the expression plasmid. The expression plasmid was then electroporated into BAX-9 of *Bacillus amyloliquefaciens*.

Bacillus amyloliquefaciens can secrete recombinant proteins using a variety of signal peptides, making it an efficient platform for producing various proteases.

This review elucidates the high-efficiency expression of the alkaline protease gene BSP-1 via *Bacillus amyloliquefaciens*. The enzyme activity and transcription level under the expression of different promoters were observed, with P43 identified as the optimal promoter for the expression of the BSP-1 gene. Overall, this review offers valuable insights into the origins and hosts for protein expression and identifies a new resource for the industrialized production of proteases.

Keywords: Alkaline protease*, Bacillus amyloliquefaciens*, Recombinant expression, BSP-1, *Bacillus subtilus*

BBM-PP-02

Antibacterial Activity and Phytochemical Analysis of Medicinal Plant Extracts against Pathogenic Bacteria

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The escalating levels of antibiotic resistance among pathogenic bacteria necessitate the exploration of alternative sources for antimicrobial agents. Medicinal plants have gained attention due to their potential antimicrobial properties and fewer side effects compared to synthetic antibiotics.

In this study, thirteen medicinal plants were selected for phytochemical analysis and evaluation of antibacterial activity against bacterial pathogen. Various solvent extracts (Petroleum ether, Acetone, Methanol, and Aqueous) of the plants were prepared, and phytochemical analysis was conducted to identify alkaloids, flavonoids, saponins, terpenoids, tannins, and other phytoconstituents. Antibacterial activity was assessed using agar well diffusion method and disc diffusion method against a panel of pathogenic bacteria.

Phytochemical analysis revealed the presence of various phytoconstituents in the plant extracts. The highest concentration of phenolics was found in *Datura innoxia* extract, while the highest flavonoid content was observed in the methanolic extract of *Homonoia riparia*. Among the tested extracts, methanol extract of *Glochidion ellipticum* exhibited the most consistent antibacterial activity against different pathogenic bacterial isolates. Other extracts showed varying degrees of inhibition against specific bacterial strains.

The study demonstrates the potential of medicinal plants as sources of antimicrobial agents. Extracts from *Heliotropium indicum, Euphorbia maculata*, and *Memecylon edule* showed promising antibacterial activity and could serve as natural alternatives to synthetic antimicrobials. Further research is warranted to explore the mechanism of action and clinical applicability of these plant-derived compounds.

Medicinal plants possess diverse phytoconstituents with antibacterial properties, making them valuable resources for antibiotic development. Extracts from selected plants exhibited significant antibacterial activity against pathogenic bacteria, highlighting their potential as alternative antimicrobial agents.

Keywords*:* Medicinal plants, phytochemical analysis, antibacterial activity, pathogenic bacteria, alternative antimicrobial agents

BBM-PP-03

Antibiogram Analysis of *Streptococcus mutans:* Isolates and Screening of Medicinal Plant Extracts for Anti-Caries Properties

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Streptococcus mutans stands as a primary instigator of dental caries, utilizing a combination of virulence factors to initiate and propagate the decay process. Through the production of lactic acid and the formation of water-insoluble glucans, *S. mutans* efficiently binds to tooth surfaces, facilitating its role in dental caries formation. Moreover, its acidophilic nature enables it to thrive in acidic environments, altering the oral microbiota to its advantage. A comprehensive study was conducted to isolate and characterize clinical strains of *S. mutans*, revealing their resistance to optochin, catalase negativity, and tolerance to 4% NaCl. Furthermore, 34 isolates were confirmed to produce exopolysaccharide dextran, a key factor in caries development. Antibiotic susceptibility testing indicated varying sensitivities, with Streptomycin, Chloramphenicol, and Tetracycline showing high efficacy. Additionally, the antibacterial potential of medicinal plant extracts against *S. mutans* was evaluated, with VNM-1 Extract exhibiting significant inhibitory effects, particularly in methanol extracts. The minimum inhibitory concentration of VNM-1 extract was found to be 2.5mg/ml, suggesting its potential as a potent antibacterial agent against *S. mutans*. These findings underscore the complex interplay between *S. mutans* virulence factors, antibiotic susceptibilities, and the potential of natural remedies in combating dental caries.

Keywords: *Streptococcus mutans,* Antibiogram Pattern, MIC Value, VNM-1 Extract, Screening

BBM-PP-04

Antioxidant Potential of *Nothapodytes nimmoniana* (J. Grah.)

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This study investigates the phytochemical composition and antioxidant activity of extracts derived from *Nothapodytes nimmoniana* (J. Grah.), a medicinal plant renowned for its therapeutic properties. The investigation focuses on assessing the potential health benefits of these extracts, particularly in combating oxidative stress-related disorders. The study employed various antioxidant assays, including the 1,1-Diphenyl-2-picrylhydrazyl (DPPH) radical scavenging assay, metal chelating activity, total antioxidant activity, ABTS radical scavenging assay, and Ferric Reducing Antioxidant Power (FRAP) assay. Results revealed that methanol extracts exhibited significant scavenging potential against DPPH and ABTS radicals, as well as notable metal chelating and ferric reducing activities. Furthermore, phytochemical analysis identified several bioactive compounds within the extracts, including butylated hydroxyanisole, 5-benzyl-1,3-dihydro-3-methyl-dibenz[b,f]azocine, and 6-phenyl-. These compounds contribute to the observed antioxidant properties of the extracts.

These findings underscore the potential of *Nothapodytes nimmoniana* extracts as natural antioxidants, offering promising avenues for further exploration in functional foods, pharmaceuticals, and nutraceuticals. Harnessing the antioxidant capacity of these extracts may contribute to mitigating oxidative stress-related diseases and promoting overall health and well-being.

Keywords: *Nothapodytes nimmoniana*, antioxidant activity, phytochemical analysis, DPPH, bioactive compounds

BBM-PP-05

Bacterial Cell Wall Lesion and Antibacterial Effects of Substituted Chromans

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In this study, novel 3-O-methoxy-4-halo, disubstituted-5,7-dimethoxy chromans with bacterial cell wall degrading potentials were synthesized, characterized, and evaluated as DNA gyrase inhibitors and antibacterial agents. Compounds showed a broad spectrum of antimicrobial activity against both Gram^{+ve} bacteria (*S. aureus* (MTCC 3160), *C. diphtheriae* (MTCC 116), *Streptococcus pyogenes* (MTCC 442)) and Gram^{-ve} bacteria (*E. coli* (MTCC 443), *P. aeruginosa* (MTCC 424), *K. pneumoniae* (MTCC 530)). Further, a molecular docking study was carried out to get more insight into the binding mode of present study compounds to target proteins (PDB ID: 2XCT (*S. aureus* DNA gyrase A), PDB ID: 3G75 (*S. aureus* DNA gyrase B), PDB ID: 3L7L (Teichoic acid polymerase). In the results, 14 > 20 > 24 > 12 > 18 > 17 were found as the most active against almost all executed activities in this study. The best antibacterial activity was obtained against Gram^{+ve} bacterium (*S. aureus*) over Gram^{-ve} bacteria evidenced by a MIC range of 0.02–1.54 μg mL^{-1}. The MIC values, compound **14** (0.474 ± 0.18 μg mL^{-1}), **20** (0.636 ± 0.14 μg mL^{-1}) and **17** (0.696 ± 0.20 μg mL^{-1}) were the most active and therapeutically potent (n = 5) (R^2 = 0.9927). Also, with an average MIC range of 0.764 ± 0.17–2.304 ± 0.67 μg mL^{-1}, the remaining compounds exhibited good antibacterial activity, except **10** (2.991 ± 0.72 μg mL^{-1}), and significantly, these values only had a slight variation with the MIC value of the standard Novobiocin (2.434 ± 0.73 μg mL^{-1}). The predicted Lipinski's filter scores, SAR, pharmacokinetic/pharmacodynamics, and ADMET properties of these compounds envisioned the draggability prospects and the necessity of further animal model evaluations of 3-O-methoxy-4-halo disubstituted 5,7-dimethoxy chromans to establish them as an effective and future antibiotic.

Keywords: ADMET; Antibacterials: Cell-Wall lesions; Drug discovery; Molecular docking

BBM-PP-06

Biological Control of Fusarium Wilt of *Solanum lycopersicum* L. (Tomato)

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Fusarium wilt poses a significant challenge to *Solanum lycopersicum* (Tomato) production, with *Fusarium oxysporum* causing widespread economic losses in tomato-growing regions. The reliance on chemical pesticides to combat this disease has led to adverse effects such as environmental pollution, biomagnification, soil fertility depletion, and the emergence of pesticide-resistant pathogens. To counter this trend, eco-friendly and sustainable disease management strategies were evaluated, utilizing fungal isolates and plants against *Fusarium oxysporum.In vitro* and *in vivo* studies assessed the antifungal efficacy of these agents. Dual culture method demonstrated that *Cephalosporium acremonium, Aspergillus niger-isolate II, Penicillium frequentans, and Trichoderma harzianum* inhibited *Fusarium oxysporum* comparably to various Aspergillus and Trichoderma species. In poisoned food technique, fresh leaf extracts of *Ruta graveolens, Azadirachta indica, Nerium oleander, Pongamia pinnata*, and *Tagetes erecta* exhibited significant pathogen inhibition.Pot experiments revealed significant increases in root length, shoot length, and leaf number in treatments with talc-based biopesticide formulations of the above-mentioned fungal isolates, as well as with powered dried leaves of the mentioned plants. Consistent results were observed in seed germination rates. In conclusion, these biocontrol agents, excluding Aspergillus species, can be scaled up for talc-based formulations and mass production of fungal biopesticides to control Fusarium wilt in *Solanum lycopersicum*. Utilizing powered dried plant leaves and talc-based formulations of fungal antagonists offers an eco-friendly alternative to chemical pesticides, promoting sustainable disease management strategies.

Key words: Biocontrol, Fusarium wilt, Fungal pathogens, Sustainable agriculture, Disease management.

BBM-PP-07

Comprehensive Study of *Nothapodytes nimmoniana* (J. Grah.): Identification and Characterization of Phytochemicals

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Nothapodytes nimmoniana an indigenous plant to the Western Ghats of India, possesses significant medicinal properties, particularly in its phytoconstituents. Compounds such as camptothecin and its derivatives exhibit diverse pharmacological activities, making the plant a subject of interest for therapeutic exploration. Additionally, its habitat within biodiversity hotspots underscores its ecological importance. This abstract highlights the phytochemical analysis, pharmacological evaluation, and potential applications of *Nothapodytes nimmoniana* contributing to both medicinal research and conservation efforts.

In this study, leaves from distinct locations within the Shivamogga district, Karnataka, were collected, dried, and subjected to solvent extraction. Various solvents were employed, ranging from acetone to double distilled water, to obtain diverse extracts. Qualitative phytochemical analysis revealed the presence of alkaloids, steroids, flavonoids, phenols, glycosides, and other bioactive compounds, with methanol extracts yielding the highest diversity of phytoconstituents. Quantitative assessment demonstrated significant levels of total phenolic and flavonoid content in the methanol extract, highlighting its potential therapeutic efficacy. Furthermore, antibacterial assays indicated notable inhibitory activity against *Streptococcus mutans*, particularly in the methanol extract. Gas Chromatography-Mass Spectrometry (GC-MS) analysis identified ten compounds in the crude extract, including tridecanal, n-hexadecanoic acid, and various benzotriazepines and benzoxazolylthio derivatives.

These findings underscore the pharmacological significance of *Nothapodytes nimmoniana* and endorse for further exploration of its therapeutic potential, particularly in the development of novel combination therapies for various diseases.

Keywords: Camptothecin, *Nothapodytes nimmoniana,* Plant Extract, Phytoconstituents.

BBM-PP-08

Effect of Incorporation of Soy Flour on Nutritional and Sensory Quality of Biscuit Fortified with *Agaricus Bisporus*

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The study focuses on addressing global challenges of malnutrition and hidden hunger, particularly in developing countries, through the development of a fortified cream biscuit enriched with banana peel flour and *Agaricus bisporus*. In this study, the wheat flour was replaced by banana peel flour and 5% of *Agaricus bisporus* dried powder, the biscuit without banana peel flour served as control. Our comprehensive evaluation included proximate analysis, sensory analysis and assessment of antioxidant properties in the cream biscuits. The fortified cream biscuit having 20% banana peel flour exhibited high nutritional content with increase in levels of moisture (4.73±0.07%), ash (10.8±0.05%), fat (15.2±0.09%), protein (38.89±0.04%), crude fiber (8.5±0.08%), iron (7.2±0.02%), and carbohydrates (29.91±0.03%), along with a high total energy content (440.45±0.05 Kcal/g) compared to control. Furthermore, it had good antioxidant properties like TPC (34.4±0.04 mg GAE/g), TFC (31.5±0.07 mg QE/g) and DPPH (75.05±0.07%). Sensory evaluation confirmed the superiority of the fortified cream biscuit in terms of flavor, color, and overall acceptability. Hence, the outcome of the study indicates that the possibility of utilizing banana peel powder to improve the overall nutritional quality of biscuits to combat malnutrition.

Key words: Banana peels powder, Cream Biscuit, Proximate analysis, DPPH, Sensory analysis.

BBM-PP-09

Evaluation On *Lactobacillus Plantarum* As Phosphate Solubilizing Microbe for Agriculture

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In this study, we investigated the ability of *Lactobacillus plantarum* (ATCC 8014) as phosphate-solubilizing microbes (PSMs) with the aim of enhancing phosphorus availability to plants. Initial screening with Pikovskaya media yielded positive results, indicating its potential. Further examination revealed a high phosphatase activity of 77.26±0.46 U/ml. Optimization studies identified favorable growth conditions, with a temperature of 45°C and pH 5, utilizing glucose and ammonium sulfate as effective carbon and nitrogen sources. Partial purification of acid phosphatase through salt precipitation and dialysis resulted in a yield of 36.68±0.05% compared to crude. Additionally, the bacterium exhibited production of various plant growth-promoting enzymes (protease, chitinase, cellulase, and pectinase) as well as plant growth-promoting hormones (IAA, ACC deaminase, HCN, and siderophore). Moreover, as a biocontrol agent, it displayed significant antagonistic activity, particularly against *F. solani* (65±0.35%), *G. candidum* (52±0.11%), and *A. alternata* (70±0.15%). These findings underscore the potential of PSMs, specifically *L. plantarum*, in sustainable agriculture by enhancing phosphorus availability and promoting plant growth.

Keywords: Phosphate-solubilizing microbes, Phosphatase activity, Pikovskaya media, Bio control agent

BBM-PP-10

Exploring Biofilms: A Comprehensive Overview

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Biofilms, intricate communities of microorganisms encased in a self-produced matrix, have garnered increasing attention due to their pervasive presence and multifaceted impacts. These complex structures play pivotal roles in various environments, from medical settings to industrial pipelines, influencing processes such as corrosion, infection, and pollutant degradation. Recent research has unveiled new insights into biofilm formation mechanisms, highlighting the importance of quorum sensing and extracellular polymeric substances (EPS) in their development and resilience. Moreover, advances in imaging techniques, such as confocal microscopy and atomic force microscopy, have enabled deeper visualization and analysis of biofilm architecture and dynamics. Understanding biofilm ecology and its interactions with host organisms or surfaces is crucial for devising effective strategies to control or harness their properties. Harnessing biofilm capabilities holds promise for applications ranging from wastewater treatment to biomedical engineering, underscoring the need for continued interdisciplinary research and innovation in this field.

Keywords: Biofilm, Microorganisms, Quorum sensing, Extracellular polymeric substances (EPS), Interdisciplinary research

BBM-PP-11

Exploring the Ecological Preferences and Essential Oil Variability in Wild *Cymbopogon Martinii* Ecotypes

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Cymbopogon martinii, known as palmarosa, has been used in aromatherapy.Cymbopogon species essential oil carry significant importance in pharmaceuticals, aromatherapy, food etc.

The study focused on the effects of ecology of wild-plant species of *Cymbopogon martinii* collected from different ecological conditions. Qualitative and quantitative analysis of essential oil of different ecotypes of *Cymbopogon martinii* species showed a significant difference. High differences in the compound composition have been found in E1(21.8%), E3(21.4%), E5(21.8%) and E6(21.3%). where as minor differences were observed in E2(19.5%) and E4(14.9%). The results are of great interest also for essential oil producers and at the same time to improve our knowledge and valorize wild officinal plants. The understanding of such aspects is necessary for providing optimal conditions to produce essential oils rich in compounds known for their biological activities.

The essential oil showed the presence of volatile oil compounds majorly belonging to monoterpenes and sesquiterpenes groups. The quantity and quality of essential oil differ substantially among the ecotypes. There was a variation in essential oil content and composition between the ecotypes studied.

Keywords: *Cymbopogon martinii,* Essential oil, variability, ecotypes

BBM-PP-12

Fungal Peptidomelanin: A Novel Biopolymer for the Chelation of Heavy Metals

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Melanin is an amorphous, highly heterogeneous polymer found across all kingdoms of life. Although the properties of melanin can greatly vary, most forms are insoluble and strongly absorb light across the visual spectrum. Here, we describe a water-soluble form of melanin (peptidomelanin) secreted by the spores of *Aspergillus niger* (strain: melanoliber) during germination. Peptidomelanin is composed of an L-DOPA core polymer that is solubilized via short, copolymerized heterogeneous peptide chains with a mean amino acid length of ~2.6. Based on in vitro experiments, we propose a biochemical copolymerization mechanism involving the hydroxylation of tyrosynylated peptides. Peptidomelanin is capable of chelating heavy metals such as lead, mercury, and uranyl in large quantities. Preliminary data indicates that peptidomelanin may have applications for the remediation of heavy metals *in-situ*, including in agricultural settings.

Keywords: fungal melanin, soluble melanin, peptidomelanin, heavy metals, mercury

BBM-PP-13

Analysis of Resveratrol Enrichment Mediated Anti-Microbial Effects and Influence of Pesticide on its Activity

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Resveratrol (trans-3,4',5-trihydroxy stilbene) is a phenolic stilbenoid is a most abundantly found in red grapes (red wine) and in many edibles. Resveratrol is a phytoalexin, that has been found to have tremendous health enhancing effects up on its consumption. Its cardio-vascular protective effects have been widely studied. However, its role in cancer prevention and anti-neoplastic effects are under intensive focus particularly for its anti-cancer stem cell roles.

This work is based on the objective, to study the effect of resveratrol on anti-microbial and to analyse effect of pesticide accumulation in plant further impacting on anti-oxidant potential of resveratrol. Resveratrol enrichment was studied in peel, pulp of grape fruits; raw and steam cooked ground nut samples by using C-18 column in a reverse-phase HPLC. Anti-microbial effects of resveratrol were assessed by using minimum zone inhibition assays against gram negative (E. coli) and gram positive (S. aureus) bacterial cultures. Reduction potential assay was done in buffer extracts of samples with and without organophosphorus pesticide in the reaction mixture. Our study has evidenced the enrichment of resveratrol in peel compared pulp that correlates with maximum zone of inhibition in both gram +ve and -ve bacterial cultures. Further, pesticide interference on reduction potential assay also indicated significance of pesticide remnants and its accumulation effecting on the role of vital anti-oxidant (resveratrol) in plants.

Keywords: Resveratrol, phenolic stilbenoid, cardio-vascular, neoplastic, anti-cancer stem cell

BBM-PP-14

GC-MS Analysis Of Bioactive Compounds from The Whole Plant Extracts of *Strobilanthus Luridus* Wight.

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Strobilanthes luridus Wight is an endemic plant of Southern Western Ghats belonging to the Family Acanthaceae. This plant was earlier reported in several districts of Kerala only. For the present study leaves, stem, inflorescence of *S. luridus* were collected from Tadiandamol forest range, Madikeri, Karnataka. The collected samples were shade-dried, powdered and extracted with different organic solvents viz., methanol, chloroform, ethyl acetate, petroleum ether and distilled water. The crude extracts were subjected to GCMS analysis for investigation of various bioactive compounds present in them. ACETYL BROMIDE, DL-ASPARTIC ACID, PIPERAZINE and ACETYLCYSTEINE were elucidated and identified using NIST library. These compounds are of immense biological importance for their medicinal properties.

Keywords: *Strobilanthes luridus.,*Acanthaceae, Tadiandamol, medicinal properties.

BBM-PP-15

Gut Bacteria Make Neurotransmitters to Shape the New-born Immune System

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The symbiotic relationship between gut bacteria, neurotransmitters, and the immune system is a captivating area of research, particularly in the context of early life development and long-term health outcomes. This intricate interplay begins early, as gut bacteria play a pivotal role in shaping the new-born immune system through the production of neurotransmitters such as serotonin and GABA (Gamma-aminobutyric acid).

Serotonin, primarily synthesized in the gut, is generated by certain bacterial strains like Lactobacillus and Bifidobacterium through the enzymatic conversion of dietary tryptophan. This serotonin production not only regulates intestinal motility and secretion but also modulates immune function, exerting significant influence on the development and functionality of the neonatal immune system.

During birth, infants are exposed to maternal microbiota, initiating the colonization of their gut with a diverse array of bacteria. This initial microbial seeding establishes the foundation for the development of the gut microbiome, which in turn profoundly impacts immune system maturation. Moreover, gut bacteria contribute to the maintenance of intestinal barrier integrity, safeguarding against the translocation of harmful substances into the bloodstream that could trigger immune responses.

The interaction between gut bacteria, neurotransmitters, and the immune system is complex and multifaceted. Gut bacteria's ability to produce neurotransmitters serves as a significant mechanism for immune modulation. These neurotransmitters, including serotonin, dopamine, and GABA, not only regulate mood, cognition, and behaviour but also act as key mediators in immune cell communication and function.

Understanding the intricate interplay between gut bacteria, neurotransmitters, and the immune system provides valuable insights into the mechanisms underlying immune regulation and overall health. This holistic perspective underscores the importance of considering the gut microbiome as a crucial determinant of immune system development and function, with profound implications for preventive and therapeutic interventions aimed at promoting lifelong health and well-being.

Keywords: Gut Bacteria, Influence on Immune Cells, Serotonin, Neurotransmitters, Gut Microbiome

BBM-PP-16

Lactic Acid Bacterial Association with Edible Flowers

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Lactic acid (LA) bacteria, are Generally Regarded as Safe (GRAS). They are known for their antimicrobial metabolites, inhibiting the proliferation of spoilage microorganisms and pathogens. Edible flowers are increasingly valued for their visual appeal, nutrients and antimicrobial attributes. The microorganisms were isolated from edible flower petals *viz*., rose (*Rosa sinensis*), hibiscus (*Hibiscus rosa-sinenis*), roselle (*Hibiscus sabdariffa*), shankapushpi (*Clitorea ternatea*) and nasturtium (*Tropaeolum majus*) by standard plate count technique using Nutrient, Martin's Rose Bengal and de Man, Rogosa and Sharpe (MRS) agar media to enumerate bacteria, fungi and LA bacteria respectively. The highest bacterial (54.32 x 10^4 CFU /g) and fungal (2.47 x 10^4 CFU /g) population was found in nasturtium. But, LA bacterial population was the highest in roselle (46.00 x 10^4 CFU /g) and the lowest in hibiscus (17.45 x 10^4 CFU /g). The LA bacterial isolates (15) were evaluated for their antibacterial activity against spoilage bacteria *viz. Bacillus subtilis* and *Serratia marcescens* and antifungal activity against spoilage fungi (*Aspergillus flavus* and *Penicillium citrinum*). Among all LA bacterial isolates, LAB-8 exhibited the highest inhibition area (4.51 cm^2 and 2.98 cm^2) followed by LAB-9 (3.64 cm^2 and 2.17 cm^2) against *Bacillus subtilis* (Gram positive) and *Serratia marcescens* (Gram negative) respectively. Similarly, the isolate LAB-1 expressed significantly the highest inhibition of fungal colony growth (4.91 and 1.65 cm^2) with % inhibition of 82.52 and 97.40 % against *Aspergillus flavus* and *Penicillium citrinum,* respectively. The isolate LAB-15 followed by LAB-1 inhibited *A. flavus* and *P. citrinum* at 67.39 and 96.08 %(colony growth *viz*., 9.16 and 2.49 cm^2) respectively. The best isolate LAB-1 and LAB-8 were identified as *Lactiplantibacillus fabifermentans* UASBMIC_001 *Leuconostoc mesenteroides* UASBMIC_008 using molecular methods. Thus, this study illuminates that the naturally associated LA bacteria with edible flowers can serve as antimicrobial agents and can prevent foods from spoilage.

Keywords: Lactic acid bacteria, Edible flowers, Antimicrobial activity, Spoilage bacteria, Spoilage fungi

BBM-PP-17

Optimizing Milk Processing: A Comprehensive Review of Procedures in Dairy Industries

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This review delves into the detailed procedures involved in milk processing within dairy industries, with a specific focus on the operations conducted at Dairy industries. Beginning with the meticulous collection of milk from registered dairies, the process progresses through rigorous quality analysis at weigh bridges before transferring to milk silos. Within the processing plant, the milk undergoes vital treatments such as pasteurization and homogenization. Pasteurization, a critical step, ensures the elimination of harmful pathogens while preserving the nutritional integrity of the milk. Simultaneously, homogenization guarantees a uniform distribution of fat particles, enhancing the consistency and taste of the final product. Furthermore, this abstract emphasizes the significance of milk quality analysis, standardization, and adherence to hygiene standards throughout processing. It underscores the necessity of regulatory compliance and introduces emerging sustainability practices within the dairy industry. Through this review, we aim to provide a holistic understanding of milk processing procedures, underlining their pivotal role in ensuring safe and high-quality dairy products for consumers.

Keywords: Milk Processing, Pasteurization, Homogenization, Quality Analysis, Dairy Industry

BBM-PP-18

Prototype of Mycelium Based Material – A Prospective Packaging Material

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Filamentous fungi have proved extremely useful in research and industry. Fungi are now employed not just for human consumption, but also in food, biofuels, detergent sectors, as well as in agriculture for pest management, veterinary and human medicine. The metabolic products of fungal species are fascinating for study and industry, and the mycelial structure of filamentous fungi is gaining attention for novel applications. One of the issues facing modern civilization is the transition to a sustainable economy, with the help of mycelium-based, biodegradable and environmentally friendly products. It is well documented that fungi can produce thin fibres that can bond the matrix material to create a biocomposite. Our project aims to analyse the possibility of using agricultural waste colonizing basidiomycetes fungi. Three basidiomycetous fungi were taken, they are *Pleurotus florida*, *Ganoderma lucidium* and *Trametes versicolor*. They have been tested for their growth and network formation in the agricultural wastes. Two strains were identified based on their fast growth, rigidity and densely packed mycelium on selected solid substrates. These biocomposite materials are easily moldable into a variety of shapes that are appropriate for producing packaging materials that are sustainable, light and biodegradable. They can also be utilised as insulator or as building materials. The biocomposite is created using low-cost raw resources such as agricultural waste and the resulting material is a sustainable alternative to synthetic materials such as polystyrene. These characteristics provide the mycelia-based biocomposite material a strong chance of becoming the material of choice in packaging applications. Assessment of the physiological and mechanical properties of this material such as compressive strength, density, compostability, flame spread, smoke emission, thermal conductivity, water vapor permeation and moisture storage would throw more light on the commercialization of mycomaterial in future.

Keywords: Mycelium, biocomposite, basidiomycetes, polystyrene, mycomaterials

BBM-PP-19

Revitalizing Radiance: Harnessing the Power of Millet in Body Lotion Formulations

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Millet has played an important role in Indian cuisine since ancient times. These grains have multiple health benefits and are rich in nutrients, fiber, and minerals. Millet is also great for our skin. But few people know this. This study is based on the production of body lotion from foxtail millet. The millet grains have an anti-aging effect. It contains lysine and methionine, ensuring smooth and youthful skin. These Vitamins and minerals contained in millet keep the skin healthy. This study focuses on using millet starch as a versatile ingredient in combination with aloe vera gel to create new skin care products. The main ingredient in the cream is millet starch, which is obtained from cereals. Its high amylopectin content contributes to desirable thickening and stabilizing properties. Another key ingredient, Millet starch is obtained by a simple and efficient method of washing, soaking, crushing, and separating. The starch was then modified to improve its texture and emulsifying properties, contributing to the consistency and stability of the cream. Aloe Vera Gel has been added to the cream to improve hydration. The cream's natural and sustainable composition addresses the growing consumer preference for eco-friendly cosmetic options. This formulation aims to leverage the nutritional benefits of millet while providing a unique and potentially beneficial skin care product. This research will contribute to the diversification of millet-based products and facilitate the use of alternative ingredients in the cosmetic industry.

Keywords: Foxtail millet, millet starch, anti-aging, emulsifier.

BBM-PP-20

Standardization of a Single Culture Media that Supports Different Bacteria Grown Together, and Measurement of Probiotic Effect of Inulin on Lactobacillus.

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Microbiomes inhabit the human body and play vital roles by providing various health benefits depending on the kind of microbial composition. The microbiome can have both healthy and potentially harmful microbes. However, microbiome composition change may have good and bad effects on the host, depending on the type of microbe that dominates. Though they coexist, occasionally a pathogenic bacterium becomes aggressively competitive to overtake health by activating different suppressive mechanisms. Since healthy bacteria provide various benefits to the host, creating an environment that favors healthy bacteria to overtake pathogenic bacteria appears to be an effective method to prevent many human diseases without any side effects and expensive medication. Among various methods recommended to inclusion of pre- or probiotics in foodstuff was found to be very effective and safer. Other than microbial cell probiotics several chemical probiotics have been used to promote the growth of healthy bacteria. Inulin is a type of soluble fiber found in many plants. It is a prebiotic that feeds the good bacteria. Thus, inulin has been used extensively in research and as a supplement. During this investigation, as a preliminary experiment, we have standardized a culture media that is suitable for culturing both healthy microorganisms (lactobacillus, Bifidobacterium, *E. coli*) and pathogenic bacteria (Klebsiella and Staphylococcus), either individually or grown together. The mixed culture results revealed that the new media composition we formulated will support the growth of both types of bacteria either alone or together. In addition, the optimal concentration of inulin for maximal growth has been determined. Further, we will find out the positive effect of inulin on the enhanced competitive ability of specific bacteria over others in mixed cultures. In expectation, we will assess the positive role of Inulin on healthy bacteria in contrast to pathogenic, either by suppressing the pathogenic bacterial growth or producing a bactericidal toxin.

Keywords: Inulin, microbiomes, bactericidal toxin, probiotics, suppressive mechanism.

BBM-PP-21

Symbiotic Fortified Barnyard Millet Based Functional Beverage

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The role of Eubiosis in maintaining health and homeostasis, cannot be emphasized more. Probiotics in general and gut microbiome in particular render a plethora of health benefits in our body. Also, millets especially Barnyard millet possess numerous ethnomedical properties viz., anti-oxidant, anti-carcinogenic, anti-inflammatory nature. P-coumaric acid chlorogenic acid protects from the complications of diabetes. With this rationale, we developed and optimized Synbiotic fortified barnyard millet based functional beverage, incorporated with *Bacillus licheniformis* with antibacterial activity and *Bifidobacterium longum*. The probiotic beverage was fortified with Magnesium, as it serves as a cofactor in over 300 enzyme systems, nerve impulse conduction, normal heart rhythm, blood glucose and blood pressure regulation. On 3 hours of incubation, after the incorporation of probiotics to the beverage, a viability of 1.3 x 10^8 CFUs /ml was found in contrast to 5 x 10^7 CFU/ml upon immediate refrigeration. The Proximate Composition of the beverage is as follows per 100g: Carbohydrates, 9.11g, Energy 62 .16 kCal, Protein 1.39 g, Total fat 2.24 g, and Dietary Fibre 1.77g. Magnesium was found to be @ 15.6 mg and 29.5 mg respectively before and after fortification ($1/5^{th}$ of RDA from a serving of 200ml of beverage) The TSS of the developed beverage is 13 brix, that can be categorised under very lightly sweetened, similar to that of packaged fruit beverage as per FSSAI Guidelines. On evaluating the pathogenic load of the beverage*, E. coli, L. monocytogenes and Salmonella* were absent. *Staphylococcus aureus and B. cereus* were < 1 CFU/ml of the beverage. Studies are underway to improve the viability of the probiotics upon storage as well as sensory and health benefits.

Keywords: Barnyard millet, Probiotic, Beverage, Fortification.

BBM-PP-22

Unlocking the Microbial Arsenal: Harnessing Lactic Acid Bacteria from Culinary Leaves for Enhanced Antimicrobial Potency

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We aimed to isolate lactic acid (LA) bacteria associated with the phylloplanes of leaves consumed both raw and in culinary practices. Microorganisms were isolated from phylloplanes by standard plate count technique using MRS, NA and MRBA media. The plates were incubated at 30 °C for 48 hours (bacteria) and 25 °C for 96 hours (fungi). *Betel vine* (*Piper betle*) had the highest LA bacteria, bacteria and fungi (10.93, 62.03 and 8.56 x 10^2 CFU/g) while jackfruit leaves had the lowest (1.07 and 2.43x 10^2 CFU/g) population of LA bacteria and bacteria. *Chekkurmanuis* (*Sauropus androgynus*) exhibited the lowest fungal population (0.81x 10^2 CFU/g). The initial screening had 21 isolates then narrowed down to 15 LA bacterial isolates for further characterization. Antimicrobial screening demonstrated antibacterial and antifungal activities, with LAB-10 and LAB-15 exhibiting statistically significant inhibition against *Serratia marcescens* and *Bacillus subtilis*. LAB-3 and LAB-5 showed significant antifungal activity against *Aspergillus flavus* and *Penicillium citrinum,* confirmed by agar plug and biomass methods. Remarkably, LAB-10 sourced from *Chekkurmanis* (*Sauropus androgynus*) and LAB-15 from *Betle vine* (*Piper betle*) exhibited excellent inhibitory effects, with an inhibition diameters ranging from 2.86 to 4.79 cm against the tested spoilage bacteria. Furthermore, antifungal activity was evaluated using agar plug method against spoilage fungi *Aspergillus flavus* and *Penicillium citrinum*. LAB-3 demonstrated significant inhibition, with colony diameters of 1.13 and 1.07 cm, while LAB-5 showed 1.20 and 1.17 cm, respectively. These findings were further corroborated by biomass method, where LAB-3 and LAB-5 inhibited fungal biomass of 0.15, 0.19 and 0.13 g/100mL, 0.08 g/100mL. The isolates LAB-10 and LAB-15 exhibits probiotic potential and they were molecularly characterized as *Lactiplantibacillus paraplantarum* and *Lactiplantibacillus argentoratensis* respectively. These results highlight the importance of employing efficient isolates that serve as potent antimicrobial agents.

Keywords: Lactic acid bacteria, Antimicrobial activity, Phylloplane, Spoilage bacteria, Spoilage fungi.

BBM-PP-23

Enhancement of Mushroom Yield and Quality by Using Nutritionally Enhanced Substrate

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Mushroom cultivation also known as Fungi-culture is becoming a trendy enterprise worldwide. The mushroom production is governed by many factors such as the cultivation procedure, type of substratum, nutritional composition of substrate, environmental conditions, contamination-free environment, and the kind of mushroom species used. To enhance mushroom production and quality, we have used modified substrate by adding various nutritional supplements rich in components such as protein-rich, carbohydrate-rich, mineral-rich, and probiotics. The commonly growing mushroom types such as white mushroom (*Pleurotus ostreatus*) and pink mushroom (*Pleurotus djamor*) were used during this investigation. The optimal environmental conditions that facilitate better mushroom growth were achieved by following an improved protocol. The quantity and quality of the mushrooms was determined by using physical, chemical, and biochemical analysis. The parameters analyzed included fresh weight, percentage of fiber, total weight, ash composition, protein content, carbohydrates, lipids, and vitamins. The comparisons between mushroom types and differences between the above parameters were determined and discussed. The effect of different supplements on the mushroom quality, nutritional composition, and total yield were estimated for the above parameters. Further, the outcome of this research will be used as a basis for improving nutritional quality and total mushroom yield by recommending specific additives. Also, the marketing potential and the economic viability of mushroom cultivation and nutritional enhancement will be estimated and the outcome will be made available for research, training, and scale-up activities.

Keywords: Mushroom, Different supplements, growth parameters, Economic value

BBM-PP-24

The World of our Misunderstood Microscopic Allies

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The world of microbiology is huge but most of us have a preconceived notion that almost all the microorganisms that are found in nature are dangerous or pathogenic. We see them as harmful creatures that destroy everything, but that is not necessarily true. Antagonistically there are many microbes residing inside the human body that are quite beneficial for us including the microorganisms that reside in our gut, lungs, oral cavities, ovaries and seminal vesicles. These perform various functions like modulating the immune system, improving its function, stimulating cellular differentiation, altering the gut brain barrier, breaking down complex biomolecules, helping in detoxification and most importantly, preventing pathogen colonisation in the body.The microbes found in our lungs play a crucial role in preventing respiratory tract diseases. The different microbes present in our lungs include *Actinobacteria, Firmicutes* and *Proteobacteria*, which compete with other microbes in the body and thus inhibit their growth inside our lungs. COPD caused 3.23 million deaths in 2019 and is speculated to take over 5 million lives in the near future. Hypothetically, the vicious circle hypothesis states that lung dysbiosis is responsible for the constant inflammatory stimulus in COPD. Similarly, there exists a diverse colony of microorganisms in our gut as well. The paramount function of these microbes is to regulate gut health and process our ingested food. Gut bacteria such as *Lactobacillus, Enterococcus* and *Bifidobacterium* are essential for maintaining epithelial integrity, enhancing the intestinal barrier, and for normal development and functioning of the immune system and central nervous system.There are many publications emphasising the negative aspect of the microbes, with the exception of gut microbiota. The purpose of this abstract is not to deny the consequences of microbial dysbiosis, but to shed light on the good aspect of these microbes living inside of us to prevent us from harming the natural microbiome due to the circulating fear associated with them and taking excessive amounts of medicines and such.

Keywords: microbiome, pathogen colonisation, COPD, microbiota, dysbiosis

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BBC-OP-01

AI-Powered Neurology: From Diagnosis to Treatment Optimization

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Artificial intelligence (AI) has revolutionized the paradigm of neurological disorder management, presenting groundbreaking avenues for diagnosis, prognosis, and treatment. This study provides an overview of the recent advancements in the application of AI in various neurological conditions, including Alzheimer's disease, Parkinson's disease, epilepsy, and stroke. Utilizing machine learning algorithms, AI has demonstrated remarkable accuracy in early detection and prediction of disease progression, aiding clinicians in making timely and informed decisions. Furthermore, AI-powered neuroimaging techniques have enabled precise lesion localization and characterization, facilitating personalized treatment strategies. Integration of AI with wearable devices and telemedicine platforms has extended its reach, enabling remote monitoring and management of patients, particularly in underserved regions. Despite these advancements, challenges such as data privacy, model interpretability, and clinical validation remain pertinent. Addressing these issues will be crucial for the widespread adoption of AI in clinical practice, ultimately improving outcomes and quality of life for individuals affected by neurological disorders.

Keywords: Artificial Intelligence, Neuroscience, Neurological Disorder, Alzheimer's disease

BBC-OP-02

An *In- Silico* Vaccine Design for Lumpy Skin Disease Virus

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Lumpy skin disease is a fatal emerging disease of cattle, which has started to gain extensive attention due to its rapid incursions across the globe. Lumpy skin disease virus (LSDV) is a poxvirus which belongs to the genus Capripoxvirus which causes lacrimation, fever, ulcerative lesions, nasal discharge, and hypersalivation and characteristic eruptions on the skin in cattles. In approximation, totally 184,447 cattle died due to Lumpy Skin Disease across India during 2022-23 which caused huge economic loss. Currently, there are no specific treatments and antiviral drugs to control the spreading of disease. Although live-attenuated vaccines have been commercialized, which started eliciting allergic responses. So, the current study uses an immunoinformatic approach to design a potential multi epitope vaccine against LSDV which can elicit the immunological responses. Initially we analysed the proteome of the LSDV and selected three antigenic proteins later we used various bioinformatic tools like BLAST P, Clustal omega, NetMHC servers, Vaxijen, Allertop, Toxinpred and IFN gamma epitope to predict the potential B-cell and T-cell epitopes. Followed by using ProtParam, PsiPred, ROBETTA, itasser, CASTP, Discovery studio and Molprobity to obtain and visualise the stable structures, then the use of GROMACS for simulation. The simulations will reveal the quality and the efficacy of the protein making it a promising candidate for use in the design of vaccines against the LSDV and other virus families as well. These outcomes suggest that the epitope-based vaccine developed in this study will be a significant candidate against LSD to control and prevent LSDV-related disorders if further investigated experimentally.

Keywords: Lumpy skin disease virus [LSDV], Capripoxvirus, ulcerative lesions, Immuno-informatics, multi epitope vaccine, simulations.

BBC-OP-03

Insilco Drug Designing For *Mycobacterium Tuberculosis* by Using Drug Designing Shivani

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Mycobacterium tuberculosis belongs to the bacterial family Mycobacteriaceae found in the lungs, kidney , spine and brain. Not everyone infected with TB bacteria becomes sick. Tuberculosis is a serious condition that can be fatal if left untreated. The bacteria is spread through the air from one person to another. They are passed through the air when someone who is sick with TB disease of the lungs or throat coughs, speaks, laughs, sings, or sneezes. Diabetes, smoking, alcohol use, and the use of other drugs are the main risk factors. The bacteria can then invade the body and cause illnesses such as tuberculosis which is an infection of the lungs , kidney, spine and brain. Mycobacterium, also known as Koch's bacillus, is a bacterium that secretes a catalase-peroxidase specific serine protease that cleaves the hinge region of catalase peroxide. This releases the effector(Fc) domain of catalase peroxide from the antigen binding (Fab) determinants. By knowing the active sites using the software like coach, Lig Bind,etc. By gathering the information from PDB, Uniport, NCBI. The Structure details from DrugBank, PubChem, Mcule. Binding site prediction using Ligplot . Energy minimization by using Haddock, MM2, MM4, Mcule. The Pathways from Drug bank, KEGG. The docking using the software Grow max, Mcule. The Virtual screening using the software Auto dock, Autodock. These methods provide a path for the development of drugs for *Mycobacterium Tuberculosis*.

Keywords*:* *Mycobacterium tuberculosis*, catalase-peroxide, antigen binding determinants, Mycobacteriaceae, drugs.

BBC-OP-04

In-silico analysis of novel bioactive compounds with inflammatory enzymes

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Inflammation is the body's protective response to invasion, injury, and other challenges to homeostasis. The major pathway involved in inflammation is the Arachidonic acid-mediated pathway, the key enzymes involved are cytosolic phospholipase2 (cPLA2), 5-lipoxygenase (5-LOX), and cyclooxygenase-2 (COX-2). Several non-steroidal anti-inflammatory drugs (NSAIDs) result in serious side effects, thus bioactive compounds from plants can be a potential therapeutic agent. The present study aimed at *in-silico* docking and drug-likeness analysis of selective bioactive compounds (Catechin, Quercetin, and curcumin) to understand their novel anti-inflammatory properties. Docking simulations were carried out using software- Marvin Sketch, Chimera, and Auto Dock vena 4.0, and drug-likeness analysis using SWISS ADME software. The simulation results revealed that all three bio-actives had good interaction with the cPLA2 enzyme and catechin shows more interaction with a least binding energy of -7.03 Kcal/mol. Similarly, all the compounds were able to form interaction with the 5-LOX enzyme, and the greater interaction was observed for catechin with a least binding energy of about -6.42Kcal/mol by forming 2 hydrogen bonds with the amino acid's residues. Compounds were docked with COX-2 enzyme and results revealing that quercetin had greater interaction with a least binding energy of -8.82Kcal/mol. The physiochemical properties of all three bioactive compounds satisfied Lipinski's 5 thumb rules indicating their drug-likeness properties. The present simulations and molecular properties analysis revealed that all the selected compounds had good interactions with inflammatory enzymes and can be used as inhibitors or scaffolds for the preparation of anti-inflammatory drugs.

Key words: Inflammation, bio-actives, lipoxygenase, cPLA2, COX-2, Catechin, Quercetin, Curcumin.

BBC-OP-05

Insilco Drug designing for *Neisseria meningitidis* by using Drug designing

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Neisseria meningitidis belongs to the bacterial family Neisseriaceae found in the nose and throat of about 1 in 10 people without causing illness. Meningococcal disease can be severe and deadly, with up to 10-14% of those who get the disease. The bacteria is spread through respiratory and throat secretions, such as saliva or spit. The main risk factor is close contact with a carrier, but other risk factors include: A weakened immune response, Smoking, and Complement deficiency. The bacteria can then invade the body and cause illnesses such as meningitis, which is an infection of the brain and spinal cord, and blood infections. *Neisseria meningitidis*, also known as meningococcus, is a bacterium that secretes an IgA1-specific serine protease that cleaves the hinge region of immunoglobulin A1 (IgA1). This releases the effector (Fc) domain of IgA1 from the antigen binding (Fab) determinants. By knowing the active sites using the using the software like coach, Ligbind,etc. By gathering the information from PDB, Uniport, NCBI. The Structure details from DrugBank, PubChem, Mcule. Binding site prediction using Ligplot . Energy minimization by using Haddock, MM2, MM4, Mcule. The Pathways from Drug bank, KEGG. The docking using the software Grow max, Mcule. The Virtual screening using the software Auto dock, Autodock. these methods provide a path for the development of drug for *Neisseria meningitidis*.

Keywords: *Neisseria meningitidis*, Meningococcal disease, Immunoglobulin A1, antigen binding determinants, meningococcus.

BBC-OP-06

In-silico Epitope-Based Vaccine Design Against Shigella sonnei: A Computational Approach to Combat Bacterial Infection

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Shigella sonnei is a gram-negative bacterium responsible for a significant portion of shigellosis cases worldwide, particularly in developing countries with poor sanitation and it poses a significant global health threat, causing a considerable burden of bacterial infections and associated mortality rates. In this study, a computational approach was employed to design an in-silico epitope-based vaccine targeting *Shigella sonnei*, Outer membrane protein C (OmpC) and virulence factors such as invasion plasmid antigens (IpaB and IpaD), were selected as a potential vaccine candidate due to their crucial role in bacterial pathogenesis, making them attractive targets for vaccine development efforts. The study utilized bioinformatics tools and algorithms to predict immunogenic epitopes within selected proteins, including OmpC, IpaB, and IpaD, crucial for *Shigella sonnei* pathogenesis. Through epitope prediction algorithms, potential immunogenic epitopes were identified within these proteins. Subsequently, a vaccine construct was designed using these epitopes, followed by structural modeling and docking studies to assess vaccine efficacy. This computational approach presents a promising strategy for the development of vaccines against *Shigella sonnei* and offers innovative insights into future vaccine design and development. The use of *in-silico* epitope-based vaccine design represents an innovative approach to combat *Shigella sonnei* infections, offering a cost-effective and rapid alternative to traditional vaccine development methods. By harnessing computational techniques, this study explores the potential of targeting specific immunogenic epitopes within key bacterial proteins, thereby enhancing vaccine efficacy and reducing the likelihood of adverse reactions.

Keywords: *Shigella sonnei*, Epitope-based vaccine, Outer membrane protein C (OmpC), Virulence factors, Computational approach.

BBC-OP-07

In-Silico Vaccine Design For *Candida Albicans*

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Candida is a type of yeast that normally lives on the skin and inside the body without causing problems. However, it can cause infections if it grows out of control or enters deep into the body, Candida causes thrush, vaginal candidiasis, Invasive candidiasis, Cutaneous candidiasis. Candidemia incidence are at approximately 9 cases per 100,000 population per year during 2013–2017.which determines the proportion of deaths.It is estimated the candidemia attributed mortality to be 19–24%.The major disadvantages of usage of Azole drugs for the treatment of fungal diseases is that it causes resistance in fungi, drug interactions, side effects, limited spectrum, cost .etc. This study aims to use vaccines as they would create an immune memory for the pathogen that can be used to pre sensitization of the body for the real time infection, but there were no approved fungal vaccinations as they are following traditional methods which might be expensive and time taking process.The use of computational biology in the form of immune information has made it easier for the development of the vaccine. The use of online webservers like IEDB, vaxijen , toxicpred, ifn gama, Haddock and the use of databases like NCBI BLAST P , PDB , uniprot, itasser, ROBETTA, CASTP, SPDBV, DISCOVERY STUDIO for the visualisation of the structures , then the use of Gromacs for simulation ,further to make the vaccine much better the use of differential gene expression can be done to specifically identify proteins for the development of even better vaccines.These methods provide a path for the development of fungal vaccination.

Keywords: Candida albicans, Azole drugs, fungal diseases, immune memory, vaccine.

BBC-OP-08

Utilizing Walnut Shell Agro-Waste for the Microwave-Assisted Extraction of Antimicrobial and Antioxidant Pectin

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The growing emphasis on healthy lifestyles and wellbeing is boosting demand for functional foods. Agricultural by-products, such as those from walnut processing which generates about 50% waste, can serve as sustainable substrates for producing these functional foods. Specifically, this walnut waste can be utilized to produce prebiotic oligosaccharides. Pectin was successfully extracted from Chilean walnut shells under acidic conditions (pH 1.5) using microwave-assisted extraction. The ideal parameters for extracting pectin from walnut shells were found to be a temperature of 74 ˚C, a microwave power of 400 W, and a solid-to-solvent ratio of 4 g per 100 ml, maintained for 16 minutes. This process yielded a maximum pectin content of 33.4 %. The characteristics of the extracted pectin were analyzed using Fourier Transform Infrared Spectroscopy (FTIR) and X-Ray Diffraction (XRD) techniques. A well diffusion assay was conducted to assess the antibacterial efficacy of the pectin extracted from walnut shells (WSP). This assay revealed significant antibacterial activity against Staphylococcus aureus and Pseudomonas aeruginosa, with inhibition zones measuring 21 ± 1mm, indicating robust antibacterial properties. Furthermore, the WSP exhibited significant antioxidant activity, as indicated by the 2,2-diphenyl-1-picryl-hydrazyl (DPPH) assay, with an IC_{50} value of 275.55 ± 0.5 µg/mL, and the ABTS (2,2-azino-bis-3-ethylbenzothiazoline-6-sulphonic acid) assay showing a radical scavenging activity of 93.48 ± 0.5 %. Scanning Electron Microscopy (SEM) analysis revealed alterations in the cell morphology of *Staphylococcus aureus* and *Pseudomonas aeruginosa* following treatment with the WSP. Consequently, pectin derived from walnut shells through microwave-assisted extraction demonstrates potential as a source of antimicrobial and antioxidant agents.

Keywords: Walnut Shell Pectin (WSP), Microwave-Assisted Extraction, Antibacterial activity, Antioxidant activity, Functional Foods.

BBC-OP-09

Virtual Screening of Resveratrol Derivatives from Millets as Potential Anti-Cancer Compounds Targeting EGFR in Colon Cancer: A Computational Study

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Colorectal cancer (CRC) remains a significant global health burden, emphasizing the urgent need for novel therapeutic approaches. Epidermal growth factor receptor (EGFR) dysregulation is prevalent in CRC, making it an attractive target for anti-cancer drug development. Resveratrol, a natural polyphenol compound found in various dietary sources, has shown promising anti-cancer properties by modulating EGFR signaling pathways. Millets, a group of nutrient-rich grains, have emerged as potential sources of bioactive compounds, including resveratrol. In this study, we employed computational methods to explore the anti-cancer potential of resveratrol derivatives from millets as EGFR regulators in colon cancer. A diverse library of resveratrol derivatives was constructed based on the structural features of resveratrol and its analogs found in millets. Virtual screening techniques, including molecular docking and molecular dynamics simulations, were utilized to assess the binding affinity and interaction profiles of these derivatives with the EGFR kinase domain. The stability and dynamics of the protein-ligand complexes were investigated through molecular dynamics simulations, providing insights into the structural changes induced by the resveratrol derivatives upon binding to EGFR. The effective biochemical compounds against CRC were also determined. Overall, our study highlights the feasibility of leveraging resveratrol derivatives from millets as promising anti-cancer agents targeting EGFR in colon cancer. The integration of computational approaches with nutritional bioinformatics offers a rational strategy for identifying bioactive compounds from dietary sources with therapeutic potential. Further experimental validation of the identified resveratrol derivatives is warranted to validate their efficacy and safety for clinical translation in CRC treatment.

Keywords: Resveratrol, EGFR, colorectal cancer, Computational Study, Millets.

BBC-PP-01

A Computational Approach to Design a Multi-Epitope Vaccine Against Pneumocystis jirovecii

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Pneumocystis jirovecii poses a significant threat to immunocompromised individuals, particularly those with HIV infection, leading to life-threatening pneumonia. Despite the advent of anti-retroviral therapy, Pneumocystis pneumonia (PCP) remains a concern, underscoring the need for novel preventive and therapeutic approaches. Here, we present an immunoinformatics-driven strategy to design a multi-epitope vaccine targeting two key antigens of Pneumocystis jirovecii: the Major Surface glycoprotein and histone acetyltransferase (HAT): Rtt109. Using immunoinformatics tools, we identified non-allergic, non-toxic, antigenic epitopes from the Major Surface glycoprotein and Rtt109, which were then linked with two different adjuvants, flagellin and PADRE sequence. The three-dimensional model of the vaccine construct was validated through Ramachandran Plot analysis, to ensure structural integrity. Molecular docking and molecular dynamics simulations were employed to assess the stability of the vaccine in binding with MHC-I and Toll-like receptors molecules, demonstrating effective interaction. Our findings suggest that the designed vaccine construct holds promise as the best fungal vaccine against Pneumocystis jirovecii pneumonia. However, further in vitro and in vivo studies are warranted to ascertain its efficacy and safety in clinical settings. This study contributes to the ongoing efforts to combat PCP and highlights the potential of immunoinformatics in vaccine development against opportunistic fungal pathogens.

Keywords: Pneumocystis jirovecii, Pneumocystis pneumonia, immunoinformatics, multi-epitope vaccine

BBC-PP-02

A Novel Strategy For Developing Vaccine Candidate Against Equine Infectious Anemia: An In-Silico Approach

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Equine Infectious Anemia, a notorious viral affliction in different Equide species, predominantly affecting horses, stands as a significant economic concern in the equestrian world. Equine infectious anemia virus (EIAV) is a member of the genus Lentivirus in the family Retroviridae, subfamily Orthoretrovirinae. Clinical signs of EIA include fever, weight loss, icterus (yellowing of body tissues), anemia, swelling in the limbs, and weakness. The incidence of Equine Infectious Anemia Virus (EIAV) is notably higher in wet, warm regions. These regions (including Iceland and possibly parts of the Middle East) typically experience favorable conditions for the vectors carrying the virus, leading to increased transmission rates among equids, particularly horses. Presently, the absence of a viable vaccine or treatment underscores the urgency for innovative solutions. So, therefore we are trying to design a multi epitope-based subunit vaccine against EIAV using an immunoinformatics approach. Our approach involves screening of T cell epitopes and B-cell epitopes from viral proteins, subsequently linking them with connectors to construct the vaccine. After vaccine construction, the physiochemical properties of a multi-epitope vaccine are also predicted by ExPASy-ProtParam tool.The vaccine's 3D structure is predicted by using Robetta server.The refinement, validation of ligand-receptor(TLR4), molecular docking and molecular dynamic simulation are in encountering advancement to assess their stable interaction. Overall, our study aims to contribute to the development of a viable vaccine candidate for EIAV, offering a promising approach to combat this economically significant viral disease in equids.

Keywords: (EIAV) Equine Infectious Anemia, Lentivirus, Horse, epitope vaccine, immunoinformatics, TLR4, immune simulation

BBC-PP-03

Acetylcholinesterase Inhibition Mediated Novel Drugs For Neurodegenerative Diseases

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Acetylcholinesterase (AChE) is a cholinergic enzyme primarily found at postsynaptic neuromuscular junctions, especially in muscles and nerves. It immediately breaks down or hydrolyzes acetylcholine (ACh), a naturally occurring neurotransmitter, into acetic acid and choline. This cholinergic activity enhances the chances of neurodegenerative diseases due to increasing amount of acetic acid in the environment. Thus, inhibiting this enzymatical cholinergic activity would be an ideal way to restrict the neurodegenerative diseases such as Parkinson Alzheimer and Huntington's diseases. Here we report 3-nitro-6-amino substituted imidazo [1,2-b] pyridazine derivatives (**5a–l**) which were synthesized in four steps and characterized by FT-IR, 1H NMR, 13C NMR and HRMS as AChE inhibitors. We evaluated AChE inhibition *in silico* & *in vitro* along with their antioxidant activities. In both the studies, compounds **5j-l** were inactive. **5c**, substituted with piperadine and **5h**, substituted with 1-phenylpiperazine were the most potent compounds (IC_{50} <0.05 μM for AChE inhibition activity). Currently, the most potent compounds **5h**, **5c** and moderately active compounds **5b**, **5d**, **5e**, **5g**, **5i** were selected for *in vivo* studies.

Keywords: Acetylcholinesterase (AChE); ADMET; Alzheimer; neurodegenerative disease; Molecular Docking

BBC-PP-04

Analysis of Common Drug Targets Implicated in Various Cancers and Drug Repurposing

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Cancer is a complex disease affecting millions of people around the world. Despite advances in surgical and radiation therapy, chemotherapy continues to be an important therapeutic option for the treatment of cancer. However, the cost of cancer treatment is increasing, largely due to the expense of taking drugs through clinical trials (typically around $2.6 billion according to a recent study) where there is only a low rate of success (around 12%). The current treatment is expensive and has several side effects. Also, over time, cancer cells develop resistance to chemotherapy, due to which there is a demand for new drugs. Therefore an urgent need to develop effective, safe, cheaper, readily available/ drug repurposing anticancer agents. Thus Drug repurposing and identification of the common drug target is a novel approach that focuses on finding new applications for the old clinically approved drugs.

Our in-silico work focuses on collection of data and screening of common proteins involved in various cellular signaling pathway that are responsible for cell proliferation and survival. Cell survival and proliferation are mediated by nuclear and cytoplasmic components that receive signals from receptors on the cell membrane through the Ras-Mitogen Activated Protein Kinase (MAPK) signaling pathway. Tumor development that is uncontrollably proliferating is often caused by dysregulation of this system in cancer.

In the current study, we have investigated 14 proteins (serine/threonine protein kinases, receptor and non-receptor protein kinases) which are screened for common drug targets implicate in 13 types of cancers (lung, ovarian, prostate, bladder, skin, leukemia, lymphoma, pancreatic, liver, thyroid, breast, colorectal and renal cancers). The screening and *in-silico* analysis reveals that, about 7 proteins are implicated in almost 6-13 types of the mentioned cancers. Among which PD1, PDL-1 and CTLA-4 are maximal occurring proteins in these 13 types of cancers. Further our analysis of drug repurposing via docking analysis is under study. Thus, our results indicate that these proteins can be common and potential therapeutic drug targets for treating various types of cancers.

Keywords: cancer, MAPK, *in-silico* analysis, Protein kinases.

BBC-PP-05

Conserved Structural Motifs across Diverse Vitamin B12 Binding Proteins

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Vitamin B12, a significant organometallic porphyrin derivative, is an essential growth factor in most organisms. Its primary function is as a cofactor in a diverse range of enzymes, belonging to diverse protein families. Understanding the conserved binding-site characteristics that enable different proteins to recognise the same ligand is therefore of significant importance. In-depth binding-site comparisons, ligand-based site alignments, clustering, and tree computing were performed employing a non-redundant dataset of known vitaminB12 binding proteins to derive the principles for vitamin B12 recognition. The 53 protein structures that bind to vitamin B12 can be clustered into 14 categories, and contain 8 unique binding motifs. Knowledge of these binding-site determinants could be used to detect the function of unknown proteins. An example analysis on the Swiss-Prot database revealed 15 proteins from pathogenic species with identified sequence motifs, indicating that they may have potential vitamin B12 binding activity and have potential as therapeutic targets.

Keywords: Structural Bioinformatics, Structural Motifs, Ligand Binding, Vitamin B12, Phylogenetic Database, Sequence Motif.

BBC-PP-06

Immunoinformatics Strategies for Multiepitope Vaccine Design against Hantavirus Infection

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Hantaviruses represent a significant public health concern, causing acute respiratory distress syndrome (ARDS) and hemorrhagic fever with renal syndrome (HFRS) in humans. Despite their global impact, no commercially available vaccine exists against these pathogens. In this study, we aimed to design an Insilico multiepitope-based vaccine (MEV) targeting Hantavirus infections. Through comprehensive immunoinformatics analysis, four key proteins of Hantavirus were identified: nucleocapsid protein, glycoprotein, RNA-dependent RNA polymerase, and nucleocapsid phosphoprotein. Utilizing state-of-the-art bioinformatics tools, potential B-cell and T-cell epitopes were predicted and assessed for antigenicity, allergenicity, toxicity, and interferon-γ induction. The vaccine construct was strategically engineered by incorporating adjuvants and linkers to enhance immunogenicity. The resultant MEV demonstrated stability, antigenicity, non-allergenicity, and non-toxicity profiles. Molecular docking and simulations further validated the structural integrity and potential efficacy of the designed vaccine. This innovative multiepitope vaccine holds promise as a candidate for mitigating the spread of Hantavirus infections. Overall, the results demonstrate the successful design of a multiepitope-based vaccine against Hantavirus, characterized by high antigenicity, safety, and potential immunogenicity. Further preclinical and clinical studies are warranted to validate the efficacy and safety of the vaccine candidate.

Keywords: immunogenicity, Hantavirus, bioinformatics tools, multiepitope-based vaccine, adjuvant linkers.

BBC-PP-07

Immunoinformatics-Driven Design And Construction of A Multi-Epitope Peptide Vaccine Candidate Against Rabies Virus

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Rabies, a neglected zoonotic disease caused by lyssaviruses, which results in lethal viral encephalitis, continues to pose a global threat. Approximately 60,000 people die from rabies each year, significantly burdening the poor rural populations in Asia and Africa. However, this data likely represents a significant underestimation owing to underreporting and uncertain estimates. Despite the availability of vaccines, up to 99% of human rabies-related deaths are caused by the classical rabies virus that is transmitted by dogs. Once clinical symptoms manifest, rabies is usually fatal, and there is currently no reliable treatment for rabies after the appearance of clinical signs of the disease. Therefore, this study aimed to design a novel multi-epitope vaccine (MEV) candidate against the rabies virus using comprehensive immunoinformatics analyses. For this, the glycoprotein (G), matrix protein (M), nucleoprotein (N), and phosphoprotein (P) of the rabies virus were investigated as potential vaccine targets. Specifically, the IEDB server was employed to predict B cell and T cell epitopes across these proteins. These epitopes were evaluated and screened for antigenicity, allergenicity, toxicity, physicochemical properties, and stability by utilizing tools like VaxiJen, Allertop, ToxinPred, and ProtParam. The selected epitopes were then linked together using appropriate linkers and conjugated with an adjuvant to enhance immunogenicity and stability. The IEDB population coverage analysis tool estimated the vaccine's average population coverage to be 99.74%, which indicates its suitability for worldwide administration. The Robetta tool was employed for molecular modeling of the vaccine construct. Additionally, molecular docking was done by the HADDOCK server and molecular Dynamic Simulations were carried out by GROMACs to check the stability of the vaccine construct. In conclusion, this study describes a novel multi-epitope peptide vaccine candidate targeting the rabies virus. This candidate warrants further pre-clinical evaluation, including in vitro and in vivo studies, to assess its potential as a safe and efficacious prophylactic strategy.

Keywords: Rabies virus, Zoonotic disease, Encephalitis, Lyssavirus, Multi-epitope vaccine (MEV), Population coverage, modeling, Immunoinformatics.

BBC-PP-08

In Silico Design And Analysis of A Multi Epitope Vaccine Against Crimean Congo Hemorrhagic Fever Virus

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Crimean-Congo Hemorrhagic Fever Virus (CCHFV) poses a significant threat to public health due to its high mortality rate and potential for outbreaks. It is the second most common viral hemorrhagic fever and widely transmitted tick-borne viral disease across the world. Despite the high fatality rate, there are unmet clinical interventions, as no antiviral drugs or vaccines for CCHF have been approved. In this study, we employed in silico methods to design a multi-epitope vaccine targeting CCHFV, aiming to enhance immunogenicity and efficacy. Using immunoinformatics tools, we identified conserved epitopes from key viral proteins, including Nucleoprotein, Putative Polyprotein, Furin resistant glycoprotein precursor known to elicit strong immune responses. The vaccine construct was designed to incorporate these epitopes along with suitable adjuvants and linkers for optimal presentation to the immune system. Molecular docking and simulation techniques were employed to assess the binding affinity of the vaccine construct with immune receptors, providing insights into its potential immunogenicity. Additionally, immunoinformatics analyses predicted the antigenicity, allergenicity, and physicochemical properties of the vaccine, ensuring its safety and stability. Our findings suggest that the designed multi-epitope vaccine holds promise as a candidate for CCHFV immunization, offering a rational approach to combat this deadly pathogen. Further experimental validation is warranted to confirm its efficacy and safety in preclinical and clinical studies.

Keywords: Crimean-Congo Hemorrhagic Fever Virus, vaccine design, multi-epitope vaccine, in silico analysis, immunoinformatics, molecular docking.

BBC-PP-09

Insilco Approach For Designing A Vaccine For Group A Streptococcus (Gas) Infection Using Immunoinformatics

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Group A Streptococcus (GAS) infections are caused by Streptococcus pyogenes, also known as Group A Streptococcus bacteria. This bacterium is responsible for a range of infections, from mild conditions like strep throat and impetigo to severe and life-threatening diseases such as necrotizing fasciitis and streptococcal toxic shock syndrome. Streptococcus pyogenes is highly adaptable to the human host, causing various infections with different levels of severity.The mortality rate for streptococcal toxic shock syndrome (STSS) is over 35%A study reported in the search results found that the case-fatality rate for invasive GAS infections was 11.7%.The case-fatality rates were 45% for septic shock, 38% for STSS, and 29% for necrotizing fasciitis.The target candidate for the vaccine design is a M protein and FbaA protein .There are currently no vaccines available to prevent GAS infections, but good hygiene practices like handwashing can help reduce transmission.The involvement of bioinformatics in the form of immune information has made it easier for the development of the vaccine .the use of online webservers like IEDB, Vaxijen , Toxinpred, Ifn gama, Haddock and the use of databases like NCBI, BLASTP , PDB , Uniprot, itasser, ROBETTA, CASTP, SPDBV, DISCOVERY STUDIO for the visualisation of the structures , then the use of Gromacs for simulation ,further to make the vaccine much better the use of differential gene expression can be done to specifically identify proteins for the development of even better vaccines . Using the selected epitopes, a chimeric vaccine construct was constructed with the peptides by linking the peptides with the GPGPG linker. These methods provide a path for the development of viral vaccination.

Keywords: Streptococcus, toxic shock syndrome, Haddock, M Protein, FbaA protein

BBC-PP-10

In silico molecular docking simulation of Ceylon cinnamon (*Cinnamomum zeylanicum*), a prized Sri-Lankan spice for its anti-diabetic property

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Diabetes mellitus (DM) stands as one of the predominant non-communicable diseases globally, characterized by elevated plasma glucose levels. Ceylon cinnamon (*Cinnamomum zeylanicum*), is an endemic plant in Sri Lanka cultivated in tropical countries for its long history of medicinal utilization. Recent studies on Ceylon cinnamon suggest its potential as a natural remedy for DM. Thus this study was designed to explore the anti-diabetic properties of Ceylon cinnamon, with a particular emphasis on the molecular docking relevance of its phytochemical constituents. Molecular docking simulations were conducted to analyze the interactions between the most commonly present phytochemicals in Ceylon cinnamon such as eugenol, methylcyclopentane, cinnamaldehyde, and 5-Hexadecenoic acid and phosphorylated insulin receptor tyrosine kinase which is one of the key molecular targets associated with the DM pathology. To perform the molecular docking studies 3D structure of a protein is taken from protein databank and the ligands structure is retrieved from Pubchem. Molecular interactions were performed using Autodock 4.2. The simulations revealed that the binding energies for the selected phytochemicals of Ceylon cinnamon and the tyrosine kinase fell within the range of -2.59 kcal/mol to -4.24 kcal/mol emphasizing favorable binding affinities and interactions. Among these phytochemicals eugenol exhibited the highest interaction (-4.24 kcal/mol), while 5-Hexadecenoic acid displayed the least potential binding interaction (-2.59 kcal/mol) with insulin receptor tyrosine kinase. Augmentation of insulin receptor tyrosine kinase activity results in enhanced glucose metabolism and protection against DM exacerbation. Therefore, Ceylon cinnamon shows promise as a therapeutic agent for DM. In conclusion, this research provides insightful information about Ceylon cinnamon's in silico anti-diabetic potential. However, more research is warranted to clarify the therapeutic applications of Ceylon cinnamon in the treatment of diabetes mellitus and to validate these results through preclinical and clinical studies.

Keywords: Diabetes Mellitus, Ceylon cinnamon, Molecular Docking, Tyrosine kinas

BBC-PP-11

In-Silico Vaccine Design Against Zika Virus (Zikv) Using Computational Tools

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Zika virus (ZIKV) is an RNA virus that rapidly spreads *Aedes* mosquito-borne sickness. Currently, there are neither effective vaccines nor therapeutics available to prevent or treat ZIKV infection. WHO declared the outbreaks of Zika virus disease were identified throughout most of the Americas and in other regions. To date, a total of 89 countries and territories have reported evidence of mosquito transmitted Zika virus infection; however, surveillance remains limited globally.

In this study we aimed to design B-cell and T-cell multi-epitope against Zika virus using in-silico vaccine approach. Immuno-informatics tools were simultaneously used to design. Molecular docking, and dynamic simulation assessments targeting the most immunogenic proteins from the membrane of ZIKV; Genome polyprotein (Capsid C protein, Envelope E protein, and Precursor-membrane protein prM). Tools were used to identify the requirements of these proteins which predicted immunodominant B and T cell epitopes. The final non-allergenic and highly antigenic multi-epitope was constituted of immunogenic screened-epitopes (5 CTL and 5 HTL) from each protein. In vaccine construction an adjuvant that have been linked using EAAAK, linkers AAY and GPGPG were added to the screened epitopes. Molecular docking among vaccine's final model and immune receptors (TLR2/TLR4) was revealed with a good binding affinity with stable molecular interactions. However, this study needs the experimental validation to demonstrate vaccine safety, to finalize this work, our team is dedicated to completing this research and realizing its full potential.

Keywords: Zika virus, In-silico, Multi-epitope, Immuno-informatics tools, Vaccine construction, Molecular docking.

BBC-PP-12

Analogs in Yeast: A Investigating the Influence of Prion Protein Mot3+ on Ssb1-Hsp70 Chaperone Activity using ATPase comprehensive overview

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The prion protein Mot3+, is classified as an intrinsically disordered protein in yeast, crucial for transcriptional regulation. We investigate the potential link between Mot3+ and activity of chaperone Ssb1 and Hsp 70. Ssb1, a vital chaperon in yeast which indirectly modulates the ATPase activity, pivotal for studying the protein misfolding. we hypothesise that Mot 3+ influences the chaperons and their ATPase activities. By studying how different analogs compete with ATP binding to both ssb1 andhsp70. Few analogs can disrupt their co-ordinated chaperone activity. We can study the sensitivity that mot3+ inflicts on different analogs.

Keywords: ATP analogues, Ssb1 chaperone, Prion strain, chaperone dynamics, Intrinsically Disordered protein (IDP).

BBC-PP-13

Unveiling Potential Therapeutic Targets in Thyroid Carcinoma Through Differential Gene Expression Analysis Using R Programming.

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Differential gene expression (DGE) analysis is one of the most used techniques for RNA-sequencing (RNA-seq) data analysis. This tool, which is typically used in various RNA-seq data processing applications, allows the identification of differentially expressed genes across two or more sample sets. Thyroid cancer is the most common endocrine malignancy, showing an increasing incidence during the last years.There are several histological types and subtypes of thyroid cancer with different cellular origins, characteristics and prognoses. Papillary thyroid carcinoma (PTC) has the highest prevalence among all thyroid malignancies, representing around 80% of all thyroid carcinomas. The main objective of the study is to identify the candidate novel biomarkers of thyroid carcinoma and investigate the relevance of the novel biomarkers as a potential target for thyroid carcinoma using R programming. TheRNA-sequencing (RNA-seq) data were collected from the TCGA(The Cancer Genome Atlas) database and find differentially expressed genes (DGEs) through R script. The dataset which are differentially expressed are further analyzed and the genes which are upregulated are chosen for the further investigation where pathway enrichment analysis is done for all the genes which are upregulated using R script as well as DAVID 6.8 database and screening is done to check whether it is significant or not through enrichment score , p-value and FDR. Potential pathways and genes are identified to find out which pathway and gene is affecting the most. A total of 6257 DGEs were identified which includes 2,030 upregulated genes and 4227 downregulated genes. In our study, upregulated genes were taken for further investigation. These upregulated genes were carried for the pathway enrichment analysis where 110 clusters were formed. These annotations suggest a significant enrichment of proteins involved in various cellular processes such as glycosylation, protein folding, cell membrane localization, and signaling. Through the signaling pathways we will find the genes which can act as a potential target.

Keywords: Differential gene expression, RNA-seq data, Thyroid cancer, R programming, Biomarkers, Pathway enrichment analysis, Upregulated genes

BBC-PP-14

Insilico Multiepitope Vaccine Design Against Human RSV B

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Human respiratory syncytial virus (hRSV) is a common and contagious respiratory illness. It is a member of the genus Pneumovirus, family of Paramyxoviridae which is one of the leading causes of lower respiratory tract infections (LRTI). It affects people from all age groups and it has severe impact on children worldwide. There are two major types of RSV, RSV-A and RSV-B. RSV-B strains take the lead in approximately one third of winter seasons. The peak season for RSV infection varies depending on climate. The countries highly affected are Bangladesh, Guatemala, Thailand, China and Egypt. While significant research has been conducted on RSV, there is no commercially available RSV vaccine currently that protects infants and young children. Hence Present study focuses on developing a Insilico multiepitope based vaccine (MEV) against Human RSV B. Using immunoinformatics tools we have designed a vaccine against Human RSV B. Briefly four proteins of RSV (fusion protein, glycoprotein, phospho protein and nucleoprotein) were selected. Potential predictions of B-cell and T-cell epitopes were followed by extensive tests like antigenicity, allergenicity, toxicity and interferon-γ. Vaccine construct was established by adding adjuvants and linkers to promote better immune response. Developed MEV was stable, antigenic, non-allergen and non-toxic. Further molecular docking and molecular simulations were carried out to validate the structural stability. The multi-epitope vaccine (MEV) designed holds significant potential as a candidate for an RSV vaccine to control and prevent the spread of RSV infections.

Keywords: Vaccine, RSV, MEV Non-Toxic

BBN-OP-01

Anti-Glucosidase Activities and Antioxidant Potentials of Selected Moth Bean Varieties

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This study set out to determine the anti-glucosidase and antioxidant capacities of six different types of moth bean seeds, an underutilized legume with high protein content which belongs to Fabaceae family. These moth bean seeds contain high phenolic components, which were also measured and compared. Colorimetric analysis was used to investigate the antioxidant potentials for scavenging activities against NO (nitic oxide) and DPPH (2,2-diphenyl-1-picrylhydrazyl) radicals. Based on the measurement of iron-ferrozine absorbance at 562 nm, the metal chelating assay was developed. α-glucosidase was employed as the target enzyme to quantify anti-diabetic potentials. Using spectrophotometric techniques, the total phenolic, total flavonoid, and hydroxycinnamic acid contents of moth bean seeds were determined by comparing them to standard plots made using standards of gallic acid, quercetin, and caffeic acid, respectively. In all varieties of moth beans, concentration-dependent radical scavenging and metal chelating activities were found. Out of the six moth bean seeds examined, it was found that RMO-423, CAZRI MOTH-2, and RMO-435 have α-glucosidase inhibitory properties. Total flavonoid, total phenolic, and hydroxycinnamic acid concentrations ranged from 1.83-9.86 mg QE per g of dry sample, 0.91-2.74 mg CAE per g of dry sample, and 12.13-21.39 mg GAE per g of dry sample, according to spectrophotometric analysis. According to our findings, CAZRI MOTH-2 and RMO-435 may be useful in the separation of potent antioxidants and anti-diabetic substances.

Keywords: Anti-diabetic, α-glucosidase, metal chelating assay, hydroxycinnamic acid, quercetin.

BBN-OP-02

Antimicrobial and DHPS Inhibitory Effects of Novel Small Molecules

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Upsurging antimicrobial resistance (AMR) needs immediate attention as it is increasing gradually and severely, small molecules drug discovery against AMR is one the effective ways to overcome these problems. In this study, we made an attempt to testify new class of methylsulfonyl-triazole (5A – L) based small molecules to carry out the anti-microbial studies against the bacteria such as *Streptococcus pyogenes* (MTCC 442), *Staphylococcus aureus* (MTCC-96), *Bacillus subtilis* (MTCC-5981)*, Escherichia coli* (MTCC 443) and *Pseudomonas aeruginosa* (MTCC 424). In addition to antimicrobial studies, we carried out HRBC membrane stabilisation, ROS modulation effect and Cytotoxic effect of these compounds. Since dihydropteroate synthase (DHPS) plays a vital role in catalytic effects and folate biosynthesis pathway that acts as a protection mechanism for both gram-positive and gram-negative organisms, we studied the enzyme inhibition studies against DHPS. To cross verify the mechanism of action of these compounds which are inhibiting DHPS, we carried out *in-silico* analysis such as molecular docking, ADMET prediction and MD simulation. In the results, we found among all methylsulfonyl-triazole derivatives (5 A-L), compound 5L showed significant dominated activity. Our future study would be screening the compound 5A-L for preclinical studies.

Keywords: Antimicrobial resistance (AMR), methylsulfonyl-triazole derivatives, dihydropteroate synthase (DHPS), ROS modulation, cytotoxic effect, *in silico* analysis.

BBN-OP-03

Antioxidant, Antimicrobial, and Anti-Cancerous Properties of *Sida rhombifolia* , *Anethum graveolens* L. Species and *Cyanthillium cinereum.*

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This research project aims to comprehensively explore the antioxidant, antimicrobial, and anti-cancerous activities of two botanical species, namely *Sida rhombifolia* and *Anethum graveolens L* and *Cyanthillium cinereum*. These species have been traditionally used in various herbal remedies and possess a rich phytochemical profile, suggesting potential therapeutic benefits .The investigation will involve multiple experimental approaches to evaluate the antioxidant capacity of both species using in vitro assays such as DPPH (2,2-diphenyl-1-picrylhydrazyl) radical scavenging activity, total phenolic content, and total flavonoid content. These assessments will provide insights into the ability of the plant extracts to neutralize harmful free radicals, thus potentially mitigating oxidative stress-related diseases. Moreover, the anti-cancerous potential of *Sida rhombifolia* and *Anethum graveolens L*. and *Cyanthillium cinereum* extracts will be evaluated using various in vitro assays, including cell viability assays, apoptosis induction assays, and cell cycle analysis. These experiments will elucidate the cytotoxic effects of the plant extracts against different cancer cell lines, paving the way for the discovery of novel anticancer agents. Overall, this interdisciplinary study seeks to unravel the pharmacological properties of *Sida rhombifolia* and *Anethum graveolens L*., *Cyanthillium cinereum*, providing valuable insights into their potential therapeutic applications in combating oxidative stress-related disorders, infectious diseases, and cancer. The findings of this research may contribute to the development of natural-based pharmaceuticals and nutraceuticals with enhanced efficacy and safety profiles.

Keywords: Antimicrobial, Antioxidant, Anti cancerous, Medicinal plants, Cytotoxic effects.

BBN-OP-04

Apoptosis inducing metabolites from marine mangrove actinobacteria

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In this study, we used Flow cytometry to assess ROS modulation, which enabled and eased the way of measuring the apoptotic inducible effects of novel microbial secondary metabolites. Marine actinobacteria has proven to be an extraordinary foundation of bioactive metabolites. This study focused on the isolation of anticancer metabolite from marine actinobacteria. *Streptomyces rochei* (Gene Bank ID: VITGAP173) mediated metabolites were isolated, identified, and also found to have promising anticancer activity against breast cancer cell lines (MCF-7). Bioassay-guided fractionation was followed to identify the bioactive metabolite from crude ethyl acetate extract of VITGAP173, which yielded four fractions. Among the four fractions, fraction B exhibited the highest cytotoxic activity against MCF-7 cell lines. Further structural and physio-chemical characterization of the column-purified fractions was done by FTIR, HPLC, HRMS, and NMR spectroscopy. The compound-2 induced cytotoxicity against MCF-7 cell lines and the half-maximal inhibition (IC_{50}) value was calculated as 4.7µg/ml. In order to elucidate the possible mechanism of cell death, MCF-7 cells were treated with the compound-2 for 24 hours and the morphological changes were examined using acridine orange – ethidium bromide (AO/EB) staining. The compound also increased the reactive oxygen species (ROS) generation (Flow cytometry, DCFH-DA). The molecular mechanism of compound-induced cell death was analyzed by real-time PCR, which revealed that the compound promotes apoptosis through the CHOP-ATF-4 pathway which is involved in ER stress signaling. The present findings suggest the apoptosis-inducing potential of compound 2 in breast cancer therapy.

Keywords: Actinobacteria; Apoptosis; Molecular docking; Metabolites

BBN-OP-05

Assessment of antioxidant and antimicrobial activity of *Eucalyptus citriodra* and its application in Neuroprotection

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Some phytochemicals play a major role in protecting neuronal health. *Eucalyptus citriodora* exhibits beneficial effects in supporting neuroprotective activities. The role of *Eucalyptus citriodora* extract was studied for antioxidant and antimicrobial activities. Phenols and flavonoids derived from the plant help in free radical scavengers lowering oxidative stress levels in the body and shielding cells from harm. This study focuses on evaluating the effects of *Eucalyptus citriodora* for its antioxidant activity DPPH (2, 2-diphenyl-1-picrylhydrazyl) was found to be IC_{50} of 176.51µg/ml. In the nitric oxide scavenging test, the IC_{50} value of 206 µg/ml. In addition, the *Eucalyptus citriodora* extract zone of inhibition was used to evaluate the antibacterial activity of the plant extract *Staphylococcus aureus*(0.46mg/ml), *Bacillus subtilis* (0.52mg/ml), *Escherichia coli* (0.86mg/ml), *Aspergillus niger* (1.43mg/ml). Eucalyptol, Aromadendrane, 1,5-Heptadiene,2,5-diethyl-3methylene, octacosanal, and heptadecanal were among the 11 metabolites isolated from *Eucalyptus citriodora* leaves and analyzed using GC-MS. This suggests that polyphenols derived from *Eucalyptus citriodora* contain precursors that act as potential metabolites associated with the onset and progress of neurodegenerative diseases. *Eucalyptus citriodora-derived* compounds from GC-MS analysis showed enhanced benefits as bioactive antioxidant compounds.

Keywords: polyphenol, flavonoid, oxidative stress, neurodegenerative, disease, metabolite.

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BBN-OP-06

Characterization of Bio-Conjugated Silver Nanoparticles Using *Caesalpinia Crista* Seed Coats Calcination and their Antibacterial Activities

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Caesalpinia crista seed coats are traditionally and medicinally useful for treating anthelmintic, tumor, placenta removal, antimicrobial, liver disorders, febrifugal, pain, inflammation, rheumatism, respiratory disorders, fever, bladder stone, malarial fever, swellings, asthma, and colic etc. In this investigation, seed coats from *Caesalpinia crista* were used to synthesize bioconjugated silver nanoparticles (AgNPs) using green method and calcination method. The effects of calcination (200 °C for 30 min) on the AgNPs' structural properties and antibacterial activity were examined. The calcinated / uncalcinated AgNPs was evaluated using the agar-well diffusion method against pathogenic bacteria, including *Pseudomonas aeroginosa*, *Escherichia coli, Salmonella typhi*, and *Staphylococcus aureus*. UV Visible spectra is used to confirm the reduction of Ag+ to AgNPs by the peak obtained at 430 nm for uncalcinated bioconjugated AgNps and the peak of calcinated bioconjugated AgNps is 285nm.. Scanning electron microscopy (SEM) and X-ray diffraction analysis (XRD) were used to measure the size of the uncalcinated and calcinated synthesized bioconjugated AgNPs, which were spherical crystalline and had sizes of 84.3 nm and 101.15 nm respectively. Functional groups of bioactive compounds were identified in the uncalcinated and calcinated bioconjugated AgNPs by Fourier Transform Infrared Spectroscopy (FT-IR) analysis. EDAX is used for determining the elemental composition of the AgNPs absorption peak in the range of 2.7 to 3.4keV in both uncalcinated and calcinated bioconjugated AgNps. According to *in -vitro* antibacterial research, uncalcinated AgNPs significantly reduced the development of tested pathogenic bacteria, but the AgNPs that had been calcinated exhibited no growth inhibition activity. Probably due to calcinations that may have degraded all the phytochemicals adhered to the Ag nanoparticles

Keywords: Caesalpinia Crista, Ag-NPs UV, SEM, FT-IR, XRD, Calcination, Antibacterial

BBN-OP-07

Computational Approach For Designing A Multi-Epitope Vaccine Against *Mycobacterium Tuberculosis*

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Tuberculosis (TB) is among the top 10 leading causes of death in under-developed countries. Statistically, TB kills more than 30,000 people each week and leads to more deaths than any other infectious disease, such as acquired immunodeficiency syndrome (AIDS), malaria, and it is a threat made direr by the coverage of drug-resistant strains of *Mycobacterium tuberculosis* (Mtb). *Tuberculosis* is an airborne infectious disease caused by *Mycobacterium tuberculosis*. Pathogens could affect the transcription of host genes, especially the ones related to the immune system, by inducing epigenetic modifications leading to serious health conditions. Currently, the only available vaccine for TB prevention is Bacillus Calmette–Guérin (BCG). However, BCG demonstrates limited efficacy, particularly in adults. Therefore, it is consequential to develop new vaccines to prevent infections caused by these strains.

Proteins of *M. tuberculosis* were found to affect the host's epigenome. Three proteins were used in this study to predict epitopes to develop an vaccine against tuberculosis. In the current study, we select the very conserved, experimentally confirmed Mtb proteins, including ESAT 6, Ag85B, **MPT64** to design a novel multi-epitope subunit vaccine. By using the Immune Epitopes Database (IEDB), we predicted different B-cell and T-cell epitopes. Immuno-informatics tools were used for molecular docking between selected screened epitopes and their corresponding MHC alleles. An adjuvant RL7_ MYCTU was added to vaccine construct to improve its immunogenicity. ROBETTA tool was used to develop the protein structure. Furthermore, secondary and tertiary structures of the vaccine peptide were predicted and docked against TLR-4 and TLR-3. Molecular dynamics simulation was performed to validate the stability of the binding complex. It was found that this proposed construction can be a promising vaccine against tuberculosis. This research embarks the best methodology for the construction of a peptide-based multi-epitope tuberculosis vaccine as the immune simulation results showed significant response for immune cells. In conclusion, our findings show that the multi-epitope vaccine may activate humoral and cellular immune responses successful vaccine candidate against tuberculosis. Hence, our proposed construct is ready for wet-lab experiments to approve its efficacy.

Keywords: *Mycobacterium tuberculosis,* airborne, novel multi-epitope vaccine,

BBN-OP-08

Crafting A Multi-Epitope Vaccine Against Anaplasma Marginale Through Immuno Informatics

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Anaplasma marginale is a gram-negative bacterium which is responsible for causing bovine anaplasmosis which is widely spread among the different parts of the world causing death among the cattle. This disease can be transmitted by ticks, A. marginale bacteria can only survive and reproduce inside the host cells. Bovine Anaplasmosis causes hemolytic anemia where the bacteria will destroy the RBCs of the host, leading to a decrease in oxygen carrying capacity of the blood. The infected cattle may exhibit symptoms such as weakness, weight loss, decrease in milk production and, in severe cases, death. In this study we attempt to develop a multi-epitope sub-unit vaccine using reverse vaccinology techniques. We selected three highly immunogenic outer membrane and virulent proteins (MSP4, VirB9, VirB10) from A. marginale based on their peptide-binding capabilities with MHC class I and II molecules on antigen-presenting cells. MSP4 allows bacteria to establish infection. VirB9 enables bacteria to interact with host cells and modulate immune response. VirB10 forms a channel for effector molecules, facilitating infection. BOLA(Bovine Leukocyte Antigen) and HLA(Human Leukocyte Antigen) allele were used to predict MHC I and MHC class II respectively. Designed sub-unit vaccine was evaluated for its immunogenicity, allergenicity, toxicity and physio-chemical parameters .Vaccine construct was designed using 4 B-Cell, 12 CTL and 12 HTL epitopes. The secondary structure was predicted using PSIPRED and the tertiary structure was evaluated using Robetta server. Molecular docking and molecular dynamics simulations with Gromacs explored the interaction, affinity, and stability between the vaccine construct and TLR4, MHC class I, and MHC class II. The computational findings from this study contribute to the identification and screening of epitopes, supporting the development of safer and more effective epitope vaccines. However, to prove the effectiveness of mounting an immune response, both in vitro and in vivo studies are required along with this in-silico study.

Keywords: Anaplasma marginale, Bovine anaplasmosis, Molecular dynamics simulation, Reverse vaccinology, multi-epitope vaccine.

BBN-OP-09

Exploring Psychobiotics from Human Breast Milk: A New Frontier in Mental Health Treatment

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Depression and anxiety are the most common mental health disorders globally, affecting approximately 5% of adults with depression. In India, there are an estimated 60 to 70 million people living with mental disorders, contributing to its high suicide rates. While pharmacotherapy and psychotherapy are widely used to manage these conditions, their potential side effects cannot be overlooked. Recent studies highlight a significant link between gut microbiota and mental health. The gut-brain axis, a complex communication network between the gastrointestinal system and the brain, significantly influences mood, cognitive function, and emotional health. There is growing evidence that certain probiotics, termed psychobiotics, may positively affect mental health by altering the gut microbiota. Psychobiotics, primarily beneficial bacteria, confer mental health benefits when consumed in sufficient quantities. These bacteria are typically sourced from fruits, vegetables, animals, and humans, with those of human origin considered particularly safe and effective due to their compatibility with human physiology. Notably, research into psychobiotics derived from human breast milk is still in its infancy, despite breast milk being a rich source of probiotics that can enhance mental health. Recognized for their safety (Generally Regarded as Safe, or GRAS) and effectiveness in treating various disorders, my research focuses on isolating psychobiotics from human breast milk and evaluating their role in treating mental disorders. Psychobiotics exert their beneficial effects by restoring gut microbiota balance, enhancing neurotransmitter production, and controlling neuroinflammation. Exploring the potential of psychobiotics to influence the gut-brain axis opens up promising avenues for enhancing mental well-being.

Keywords: Psychobiotics, Gut-brain axis, Mental health disorders, Human breast milk, Gut microbiota, Neurotransmitter production

BBN-OP-10

Flow Cytometry Applications In Discovering Natural Antimicrobials from *Terminalia Chebula* For Predominant Uropathogen

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Antimicrobial resistance (AMR) is an up-surging global health and growth menace that needs immediate attention in discovering novel and effective antimicrobials, especially in natural ways. We aimed to isolate and identify the predominant uropathogen *Escherichia coli* from Urinary Tract Infection (UTI) clinical samples were used as a source organism to evaluate the antimicrobial susceptibility by flowcytometry and anti-biofilm effect of some natural products such as pyrogallol obtained from *Terminalia chebula*. Flow cytometry is an advantageous technique that was used in this study to evaluate bacteria for antimicrobial susceptibility. *E. coli* (MTCC 10898) strain which is susceptible to all antimicrobials, and UTI clinical isolates of *E. coli were* resistant to the same antimicrobial agents used. The isolated predominant uropathogen *E. coli* was identified over 16S rRNA-based next genome sequencing techniques and the sequences deposited in the NCBI-Gene bank (NCBI: SUB4276507). Pyrogallol along with other compounds isolated from *T. chebula* were characterized by TLC, FTIR, GCMS, and NMR. Before flow cytometry assessments, the susceptibility of all isolates was tested using the disc-diffusion method. To execute flow cytometry, standard concentrations of natural products were added to *E. coli*, and incubated for up to 3 hours at 37ºC. To enumerate the number of viable cells (control).At regular time intervals the selected bacteria were isolated and inoculated to Luria Bertani agar(LBA). The incubated *E. coli* in different time intervals were subjected to propidium iodide (PI) staining to analyze them over flow cytometry. The expected growth rate of bacterial cells was evaluated using the same samples by incubating them for 24h at 37ºC. As a remarkable outcome, in contrast to colonies counting on agar plates, the estimated antimicrobial susceptibility during 1 and 3 hours showed a higher number of viable bacterial cells detected by flow cytometry. In addition to the flow cytometry studies, an antibiofilm activity was evaluated using the crystal violet staining method, and the biofilm disruption was also confirmed by Scanning Electron Microscopy (SEM). We conducted a molecular docking study to assess the present study's compound interaction with the FimH lectin domain from *E. coli* K12 (PDB ID: 6GTY). FimH, an adhesive protein, helps in *E. coli* adhesion to uroepithelial cells. This *in-silico* study revealed the mechanism of action of the compound with the ligand efficiency, least binding affinity, and inhibitory constant (*ki*). In conclusion, flow cytometry allows primary assessment of bacterial resistance to antibiotics and can be optimized and used as an effective and alternative tool to detect multi-resistant bacterial isolates. Overall results provide a fruitful, natural antimicrobial and anti-biofilm research foothold shortly.

Keywords: Antibiofilm; Antimicrobial resistance (AMR); *Escherichia coli*; Flow cytometry, Molecular Docking; *Terminalia chebula*.

BBN-OP-11

HEPATITS – A Virus of Concern

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Hepatitis is defined as inflammation of the liver that can result from a variety of causes such as heavy alcohol use, autoimmune, drugs, or toxins. Viral infections affecting the liver have had an important impact on humanity, as they have led to significant morbidity and mortality in patients with acute and chronic infections. Hepatitis is the global health problem causing acute and chronic infections that can lead to liver cirrhosis and hepatocellular carcinoma {HCC}. These infections are the leading cause for HCC and liver cancer. This review article describes the types, epidemiology, pathogenesis, clinical presentation, diagnosis, HCC, current medication and upcoming treatment.

The most common types of viral hepatitis are Hepatitis A, Hepatitis B, and Hepatitis C. The other types of viral hepatitis are hepatitis D and E and are less frequently encountered.

Hepatitis A is an RNA virus from the Picornaviridae family.

Hepatitis B virus is a DNA virus and which is a member of the Hepadnaviridae family.

Hepatitis C virus is an RNA virus and member of the Flaviviridae family.

Hepatitis D is an RNA virus in the Deltavirus genus.

Hepatitis E is an RNA virus in the Hepevirus genus.

Future aspects – in may 2016, the World Health Assembly endorsed the Global Health Sector Strategy (GHSS) on viral hepatits, which proposes to eliminate viral hepatitis as a public health threat by 2030.

Keywords: Hepatitis A, Hepatitis B, Hepatitis c, Hepatitis D, Hepatitis E, Hepatitis Delta HCC , Liver cirrhosis.

BBN-OP-12

Insights into Liver Hepatocellular Carcinoma: Biomarkers and Therapeutic Avenues Revealed by Differential Gene Expression studies

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Liver Hepatocellular Carcinoma (LIHC) is a major global health concern, often arising from underlying liver diseases like viral hepatitis, alcohol-related liver disease, and obesity-related conditions. Despite advances, LIHC diagnosis and treatment remain challenging due to late detection and limited therapeutic options. Understanding LIHC's molecular mechanisms is crucial for improving outcomes. Data analysed from TCGA database reveal genetic and epigenetic alterations driving LIHC, offering insights into potential biomarkers and therapeutic targets.

This study identifies potential biomarkers and therapeutic targets for Liver Hepatocellular Carcinoma (LIHC) using bioinformatics analysis data from TCGA database. Analysis with edgeR R software reveals 3437 differentially expressed genes (DEGs) in LIHC patients compared to normal samples. Subsequent STRING network analysis and Cytoscape identifies 20 hub genes associated with LIHC, unveiling complex gene interactions. Pathway enrichment analysis using DAVID database highlights enrichment of pathways related to metal ion homeostasis and detoxification in LIHC. Notably, MT1E, MT1H, MT1M, CYP4A22, CYP4F12, AADAT, and COLEC10 emerge as promising LIHC biomarkers and treatment targets based on their high enrichment scores, low p-values, and FDR. These findings deepen our understanding of LIHC pathogenesis and offer new avenues for therapeutic intervention. By uncovering key pathways and hub genes in LIHC, this study contributes to advancing LIHC biology and may inform the development of innovative diagnostic and therapeutic approaches.

Keywords: LIHC, biomarkers, therapeutic targets, gene expression, bioinformatics analysis, edgeR, STRING, pathway enrichment, homeostasis, detoxification.

BBN-OP-13

In silico design of a multi-epitope-based vaccine targeting gametocytes and gametes of *Plasmodium falciparum* – An immunoinformatic approach towards transmission block

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Malaria, caused by *Plasmodium falciparum (Pf)*, is among the biggest public health problems worldwide. The female *Anopheles* mosquito regulates malaria transmission by consuming gametocytes from the human host and transferring sporozoites from the arthropod saliva into the bloodstream of the vertebrate host. Interrupting transmission is the primary technique for malaria elimination. Malaria transmission must occur in the gametocyte stage. As a result, gametocyte carriage in asymptomatic and sub-microscopic infections sustain malaria transmission. Vaccines target gametocytes and possibly gametes can aid in transmission block and infection eradication. In this study, we use *in-silico* and distinctive immunoinformatic databases, also a variety of bioinformatics application software upon cell surface protein of *Pf* gametocytes and gametes to predict potent epitopes for the experiment. We selected 6 epitopes from the target envelope of the parasite gametocytes and gametes by determining the potential of both innate and acquired immunity by T and B cell-mediated response. Three genes that expressed in all stages, the gametocytes, and the gamete stages were selected. The gene sequences were procured and tested for antigenicity, allergy, and toxicity. Bioinformatically, the B cell epitopes, MHC I epitopes, and MHC II epitopes were predicted alongside their physicochemical properties. A multi-epitope vaccine was constructed from select epitopes which exhibited 100% conservation. Evaluation of physicochemical properties of vaccine and structure prediction has also been carried out. Although an immunoinformatic experiment during this study implies that the designed multi-epitope vaccine can perform an immune reaction against the sexual stages, further acceptance of the proposed vaccine should be done through in-vitro and in- vivo experiments to validate and review the efficacy.

Keywords: Malaria, gametocytes, immunoinformatics, surface proteins, multi-epitope vaccine.

BBN-OP-14

Investigation of Phytochemicals and antioxidant capacity of *Leucas aspera* using conventional extraction

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Free radicals are produced by several physiological activities. If they are not scavenged at the right time, it can lead to damage to the biomolecules. Many phytochemicals help scavenge free radicals and help to prevent neurodegenerative diseases. Our study focuses on the evaluation of flavonoids and phenols derived from *Leucas aspera* for radical scavenging activity. Herein, we evaluate the effects of *Leucas aspera* and derived metabolites exhibited antioxidant radical scavenging assay whose IC_{50} of 97.56 µg/ml, nitric oxide scavenging, and ferric reducing power assay exhibited an IC_{50} of 549 µg/ml. Additionally, the phosphomolybdenum assay indicated a plant extract content of 548 µg/ml. Antimicrobial assay of the plant extract whose zone of inhibition was determined as *Staphylococus aureus* (0.46mg/ml), *Bacillus subtilis* (0.52mg/ml), *Escherichia coli* (0.86mg/ml), *Aspergillus niger* (1.43mg/ml). *Leucas aspera* using GC-MS Tetrateracontane (27.591%), Squalene (23.666%), Tetracosane (22.605%). Triterpenoids compounds primarily found in *Leucas aspera* extract exhibit significant antioxidative activities across Ferric reducing antioxidant power, Nitric oxide, hydrogen peroxide scavenging, and phsophomolybdenum assays. The study's findings suggest that *Leucas aspera* leaves harbour majority of compounds showcasing notable antioxidant activity. Cell cytotoxicity assay showed the viability of cell count as 85% which was analyzed by cell viability percentage. The MTT test quantified cellular activity and responsiveness to the plant extract treatments. The P value observed was significantly different among the groups $p < 0.001$ value between different solvents were tested. Hence the findings depict that *Leucas aspera* acts as a potent antioxidant.

Keywords: Neurodegenerative, metabolites, oxidative stress, polyphenol, flavonoid, antimicrobial.

BBN-OP-15

Isolation Of *Streptococcus Mutans* And Preliminary Screening Of Glucosyltransferases Enzyme From *Streptococcus Mutans* Of Clinical Dental Caries Sample

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Dental caries, a pervasive oral disease, poses a significant threat to global oral health. *Streptococcus mutans*, a common bacterium in the oral microbiota, plays a crucial role in caries formation through the production of glucosyltransferase (GTF) enzymes. These enzymes catalyze the synthesis of glucans from sucrose, promoting the development of dental plaque and subsequent caries. This study aimed to screen and identify glucosyltransferase enzymes from clinical dental caries samples. Approximately fifty dental caries-positive samples were collected from various dental clinics in and around Shivamogga city, Karnataka. Forty of these samples tested positive for *Streptococcus mutans*, and subsequent screening revealed that 30 of the isolates produced glucosyltransferase enzymes. Among them, isolate SM-18 exhibited significant enzyme activity, with an enzyme activity of 0.19 U/ml and a specific activity of 0.24 U/mg. Further optimization studies determined the optimal conditions for enzyme activity, including a pH of 6.5, a temperature of 40°C, an incubation time of 18-19 hours, and a substrate concentration of 70 g/L. The extracted enzyme, precipitated at 70% ammonium sulfate, demonstrated a molecular weight of approximately 65 kDa. Subsequent purification steps were undertaken for further characterization. This study underscores the importance of understanding the enzymatic mechanisms involved in dental caries formation, providing insights for potential therapeutic interventions.

Keywords: Dental caries, Enzyme screening, Glucosyltransferase enzyme, *Streptococcus mutans.*

BBN-OP-16

Production, Characterization and Biological Activity of Pigment Produced by *Talaromyces atroroseus* FST 1

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The appeal of food is greatly influenced by its colours, which significantly impact consumer acceptance. Over time, colour additives have been employed to enhance the visual allure of food products. However, synthetic food colorants are increasingly recognized as carcinogenic and harmful to consumers, sparking a rise in interest in natural pigments as substitutes. This study was carried out to isolate pigment producing fungal culture from soil and identification by microscopic and molecular methods, cultivation by submerged fermentation, extraction of pigment using solvents, and it's characterization by various analytical techniques such as TLC, FTIR, UV- Visible spectroscopy and LC-MS. Additionally, the extracted pigment was evaluated for it's antioxidant and antimicrobial properties. Finally, the extracted pigment was incorporated in the preparation of gelly candies and it's toxicological properties were evaluated. The results showed that the isolated pigment producing fungal culture was identified as *Talaromycesatroroseus*FST1 by molecular methods. The extracted pigment was identified as Monascorubramine by analytical methods. Further the extracted pigment exhibited a total phenolic content of 96.09 ± 0.47 mg/g GAE, DPPH scavenging activity of 109.321 mg/g, total antioxidant capacity of 14.69 ± 0.32 mg/g AE, hydrogen peroxide scavenging activity of 337.204 ± 28.87 mg/g AE, and ferric reducing antioxidant power of 454.288 ± 43.87 mg/g AE. The antibacterial activity of extracted pigment showed significant zone of clearance against *E coli* OP50 by agar well diffusion method. The minimum inhibitory concentration and minimum bactericidal concentration of the pigment was found to be 500 mg/g. The extracted pigment incorporated jelly candies scored high according to hedonic rating. Furthermore, the toxicology analysis suggested the pigment could be safely incorporated into food at concentrations of up to 2000 ppm. In summary, this research advances our understanding of fungal pigment production and underscores its potential applications in the food industry, providing safer alternatives to synthetic colour additives.

Keywords: Pigments, Food colorants, Talaromycesatroroseus, Monascorubramine, gelly candies, DPPH

BBN-OP-17

Phyto nanoparticle Drug Delivery System for the Treatment of Lung Cancer

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Lung cancer remains a formidable challenge, and the quest for effective treatments is ongoing. Noscapine Hydrochloride, an alkaloid derived from opium, has shown promising anticancer properties by disrupting microtubule dynamics, leading to cell cycle arrest and apoptosis. However, its clinical application is limited by poor solubility and systemic toxicity. This is where nanoparticle drug delivery systems come into play, offering a targeted and efficient approach to combat lung cancer. Nanoparticles, with their small size and versatile surface properties, can penetrate and accumulate in tumors, carry high drug payloads, and facilitate sustained drug release. Targeted drug delivery will be facilitated using nanoparticles coated with Noscapine Hydrochloride through receptors-ligand mediated endocytosis specific to lung cancer. specific to aberrant ligands in the case of lung cancer, we aim to facilitate the targeted delivery through receptor-mediated endocytosis. The objectives include using molecular docking studies to identify the binding efficiency of drug-coated nanoparticles derived from potential medicinal plants to the aberrantly expressed ligands and investigating the anti-cancerous properties using *in-vitro* studies in lung cancer-derived cell lines.

Keywords: Nanoparticles, noscapine hydrochloride, receptor-ligand mediated endocytosis, molecular docking, drug-coated nanoparticles, binding efficiency, lung cancer.

BBN-OP-18

Evidence that Bacillus subtilis SC3.7 of soya origin produces sublichenin and subtilosin type of peptide Lantibiotics

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Antimicrobial peptide derived from food grade microorganisms are of great interest due to their potential application as a biopreservative. Nisin produced by the dairy bacterium *Lactobacillus lactis* has a profound application in biopreservation of several different food commodities especially dairy products and canned food products. Subtilin a natural relative of nisin produced by spore forming bacilli is a potential candidate exploring for the biopreservation purpose. *Bacillus subtilis* is a versatile aerobic bacteria known for the production of several different metabolites including peptide antibiotics. There are atleast ten variants of nisin discovered so far. However, in case of subtilin only four variants are known.

Inorder to obtain a potent food grade bacilli for the production of subtilin like and subtilosin having broad spectrum activity having the ability to produce any other antibiotics. This study was undertaken In order to obtain potent bacillus culture exhibiting antimicrobial activity from different fermented food including soy chutney. We employed cellular biosensor specific to cell wall (BSF2470) and BS168.BS2 for subtilin like lantibiotic production for high throughput screening purpose. B. subtilis SC3.7 obtained from soya seed chutney was exhibited antimicrobial activity against several Gram-positive and Gram-negative food spoilage bacteria. Hence, the strain *B. subtilis* sc 3.7 was considered for subsequent studies. Whole genome sequencing of *B. subtilis* SC3.7 confirmed presence of sublichenin and subtilosin gene clusters. Through genome annotation two bacteriocin genes for sublichenin and subtilosin A were also identified. Bioinformatic tools were used to compare the gene cluster of sublichenin and subtilosin produced by *B. licheniformis* and *B. subtilis* BS168. Further, mass spectrometric analysis of partially purified antimicrobial compound confirmed the secretion of sublichenin (3346 Da), its succinylated form (3446 Da) and subtilosin A (3399 Da). This new combination of bacteriocin can be an effective biopreservative in food industry.

Keywords: antibacterial activity; *B. subtilis* SC 3.7; bacteriocins; fermented foods

BBN-PP-01

A Comprehensive Analysis of *Tinea corporis* Infection: From Diagnosis to Management

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Corporis or *Tinea corporis* is a contagious fungal infection affecting external epidermal layer of hands, feet, nails, groin, scalp. Appears in the shape of a ring and termed Ringworm infection. A warm humid atmosphere and sharing of cloths and bedding aid in transmission with incubation time of 1 to 3 weeks. Different species of Tinea causes infections at different areas. Major concern with *Tinea corporis* is recurring infection due to the lack of proper medication to cure the disease which can disrupt the social and personal life of the individual. Most of the treatments available are focused on reducing the severity of the infection rather than eradicating it. Transmission of the disease can occur by Geophilic, Zoophilic or Anthrophilic means. Deep-rooted fungal infections often penetrate regions near or below the hair follicles, making it imperative to address them effectively beneath the surface. Successful eradication at this level can lead to the eventual demise of superficial manifestations over time. Methods for tackling infections include use of potassium hydroxide preparation (KOH), topical anti-fungal creams or gels like terbinafine and azoles. Diagnostic procedures often involve skin biopsy and obtaining the fungal pathogen by culturing on different media. Also, UV light emitted from a Woods lamp can be used to treat the infection's tropical effects. Once the fungal identification yields positive results, the treatment approach often involves a combination therapy. This may entail the application of croton oil in conjunction with salicylic acid, a synergistic blend that not only addresses the infection effectively but also minimises potential drawbacks or side effects. This study focuses on different aspects of tinea corporis infection, including prevalence, risk factors, clinical manifestations, and treatment outcomes. These findings underscore the importance of early diagnosis and appropriate management strategies to effectively control this dermatological disease condition.

Keywords: *Tinea corporis*, Anthrophilic, Anti-fungal, Zoophilic, Geophilic.

BBN-PP-02

An *In-Vitro* Study to Understand the Impact of Cardiovascular, Diabetic and NSAID Drugs on the Region-Specific Human Gut Microbiota Model

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The gut microbiome, which refers to the diverse community of microorganisms residing in our digestive system, plays a crucial role in maintaining our overall health and well-being. In recent years, there has been a growing interest in understanding how different drugs, affect the delicate balance of the gut microbiome. This study aims to understand the effects of certain commonly used Cardiovascular, Diabetic and NSAID disease treating drugs on the human gut microbiome at varying pH based on the different regions of the gut. The diversity and the number of the microbial cells differ according to the regions of the gut. The pH is one of the main differing features in the various regions of the gut. This study tries to form *in vitro* models of the gut microbiome at varying pH. The pH of the gut ranges from 1.0 to 7.4. Four models at pH 2.4 (Stomach), 5.5 (Colon), 6.3 (Duodenum) and 7.4 (Jejunum and Ileum) were formed using Brain Heart Infusion broth to maximally mimic the environment of the human gut. It was seen that the concentration of cells was maximum at the pH 7.4 and 6.3. Minimal growth was seen at the pH 2.4. The effect of the said drugs was tested on these Microbiota models. The volume of the gut also varies along with the region, according to literature survey, after consumption of 240ml of water (approximately 1 glass of water) the volume of stomach was found to be 242 ± 9 mL and that of small intestine was found to be 94 ± 24 ml. Thus, the drugs were dissolved in a 250ml and 100ml saline solution to maintain their concentration as similar in the stomach and the small intestine respectively. The consortium of the microbes was then grown with these drugs to understand if the drugs had any effect on the microbiota model. It was indeed seen that these drugs had a negative effect on the growth of the healthy microbes. Based on these studies the development of a safer and more effective treatment plan can be devised in the future that would minimize the unintended consequences of these drugs on microbial communities.

Keywords: Human gut microbiota model, Varying pH, long term drugs, effect of drugs.

BBN-PP-03

Anti-Biofilm and Fim-H Inhibition Effects of Natural Medicine from *Myristica Fragrans* against Predominant Uropathogens

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The main objective of the present study is to unveil the antibacterial activity of natural products extracted from *Myristica fragrans* against the predominant uropathogen. Uropathogen was isolated from Urinary Tract Infection (UTI) patient-derived clinical samples. Organisms were identified over metagenomics approaches, i.e., 16S rRNA methods (Gene Bank ID: KX929843.1). One compound from *Myristica fragrans*, N-(2-(dibenzo[b,d]furan-2-yl)ethyl)-3-phenylpropanolamine, was purely isolated and identified by analytical techniques such as TLC, GCMS, FTIR, and NMR. Antibacterial activity employing staining-based antibiofilm assay and the confirmation by SEM analysis was executed. N-(2-(dibenzo[b,d]furan-2-yl)ethyl)-3-phenylpropanolamine was docked with Fim-H receptor protein, which is highly involved in the adhesion of bacteria to uro-epithelial cells that might serve as supportive evidence. To confirm N-(2-(dibenzo[b,d]furan-2-yl)ethyl)-3-phenylpropanolamine drug efficacy, ADME properties were also calculated. N-(2-(dibenzo[b,d]furan-2-yl)ethyl)-3-phenylpropanamide exhibited a remarkable inhibition against the bacterial pathogen. Molecular docking with Fim-H receptor protein (PDB ID: 4X5R) showed a doorstep way to understand the mechanism of action through the molecular interaction as well as the established molecular mechanics values that include the least binding affinity, ligand efficiency, and inhibitory constant (*ki*). This helped determine the mode of action of possible drug moiety that interacts with the target of interest in the best possible way. Conclusively, our entire focus has been on identifying the anti-uropathogenic bacterial property of N-(2-(dibenzo[b,d]furan-2-yl)ethyl)-3-phenylpropanolamine from *Myristica fragrans* providing a valuable foothold for detailed research shortly.

Keywords: Antimicrobial, Biofilm, *E. coli, Fim*-H, *Myristica fragrans,* Uropathogen

BBN-PP-04

Anticancer Potential of Myricetin: Investigating Cellular Processes andApoptotic Gene Expression in MCF-7 Breast Cancer Cells.

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Cancer is the maincivic health concern worldwide and main burden of the healthcare system. Unfortunately, most of the currently used cancer treatment approaches cause adverse side effects such as hair loss, nausea, vomiting and other complications. However, to overcome these limitations, there is an urgent need to search for the alternative anticancer drugs with better efficacy as well as less adverse complications. Based on the scientific evidences, it is proven that naturally occurring antioxidants present in medicinal plants or their bioactive compounds might constitute a good therapeutic approach in disease management including cancer. In this regard,Myricetin demonstrates considerable potential in the area of anticancer research. It is known tobe recognized as a rich natural polyphenolic flavonoid found abundantly in diverse dietarysources. This study aims to shed light on the impact of myricetin on cellular processes, includingcell death, cell cycle dynamics and the expression of apoptotic genes in MCF-7 (breast cancer)cells. The cytotoxicity of myricetin was evaluated by MTT assay. Cell cycle analysis using MCF-7 cells understood the myricetin-inducedapoptosis at Sub G0/G1 phase (apoptosis phase). The verification of myricetin-inducedapoptosis in in-vitro cell lines was obtained through Annexin V/propidium iodide flowcytometric analysis. Aquantitative real-time polymerase chainreaction was used to evaluate the expression of apoptosis-related genes in MCF-7 cells. Thefindings displayed an up-regulation of the anti-apoptotic gene BCl2, in conjunction with elevatedexpression of caspase 9 and caspase 7, while the caspase-3 gene exhibited down-regulation. Theresult of this study indicated that Myricetin exhibits a potent apoptotic effect by inhibiting cellcycle progression, however, further in-vivo investigations are needed to understand thecomplexity of this molecule.

Keywords: Apoptosis, breast cancer, cell cycle, myricetin.

BBN-PP-05

Design and Construct of Multi-epitope Vaccine against *Helicobacter pylori* by Immunoinformatics Approach

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Helicobacter pylori is one of the most common bacteria that colonizes the human stomach. It is a major cause of stomach cancer, gastric adenocarcinoma, and gastric lymphoma and is listed as a Class I carcinogen by the World Health Organization. Treatment of *H. pylori* with proton pump inhibitors and antibiotics is effective but can lead to increased antibiotic resistance, patient dissatisfaction, and risk of relapse. Tackling existing drugs is a difficult task due to lack of appropriate common targets against genetically diverse strains. Therefore, the development of an effective vaccine requires other strategies to eliminate *H. pylori* infection. Since, there is no active vaccines for *H. pylori* present in the market. In this study, we had approach and developed a multi-epitope vaccine construct against *H. pylori* using the best helper T lymphocytes (HTLs) and cytotoxic T lymphocytes (CTLs) epitopes (IEDB) which has been chosen according to antigenicity, toxicity and allergenicity for four target antigenic proteins (CagA, FlaA, VacA and HpaA), and found the induction of possible immune response using advanced immunoinformatics approaches. The chosen epitopes, suitable linkers, as well as adjuvants were combined for creating a final vaccine design. The Population Coverage (IEDB), Physicochemical Properties (ProtParam) and Secondary Structure (Robetta) were evaluated using different in silico tools, indicating that it could be a good and effective vaccine construct. Protein–protein docking between human Toll like receptor 4 (TLR4) and vaccine construct help to predict the way of inductive signaling that leads to immune-response. Molecular docking analysis by HADDOCK along with molecular dynamics (MD) simulation by GROMACS performed on multi-epitope vaccine. In conclusion, these analyses indicate that the suggested vaccine may produce particular immune responses against *H. pylori*, but laboratory validation is needed to verify the safety and immunogenicity status of the suggested vaccine design.

Keywords: Helicobacter pylori, Gastric Cancer, multi-epitope vaccine, Immunoinformatics, Protein-Docking.

BBN-PP-06

Design of Beta-Glucan Loaded Hydrogels for Topical Treatment of Wounds

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Hydrogels are water-absorbing polymer networks which are promising in Wound Healing. They maintain moisture, manage exudates, prevent infections, and offer a protective barrier, promoting faster healing. Traditional Wound Healing methods take longer and are inconvenient to use, causing discomfort to the user, as certain individuals face sensitivity issues due to their wounds. The addition of β-glucan, extracted from *Lentinula edodes* (Shiitake mushrooms) along with Chitosan enhances wound healing with anti-inflammatory and antimicrobial properties. The objectives of the study were: Extraction of β-glucan from *Lentinula edodes* (Shiitake mushrooms), Preparation of PVA-Chitosan based hydrogels loaded with β-glucan and Evaluation of wound healing property of the prepared hydrogels. The methodology that was followed was as follows: Selection and procurement of mushroom species (*Lentinula edodes*), Hot water extraction and lyophilization to extract β-glucan from Shiitake mushrooms, Characterization and Confirmation of β-glucan, Synthesis of PVA-Chitosan hydrogel, Introduction of β-glucan to hydrogel and Characterization tests on hydrogel. The presence of β-glucan was confirmed in the mushroom extract. PVA-Chitosan based hydrogels were prepared at different concentrations and multiple combinations for further testing and analysis. Evaluation of the hydrogels by various methods suggested the potential of the PVA-Chitosan hydrogels in wound healing.

Keywords: β-glucan, Shiitake mushrooms, Wound Healing, Hydrogels, Chitosan

BBN-PP-07

Designing of Chimeric Vaccine against Canine Distemper Virus

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The canine distemper virus is highly contagious and affects dog's respiratory systems. The virus belongs to the paramyxoviridae family and order Mononegavirales. This class of viruses contains a negative-strand RNA. This virus also affects raccoons, foxes, and other animals. The disease is often fatal with high mortality rate of 50% in adult dogs and 80% in puppies. It is found that there is no proper vaccine for this virus.The current study aims to design a vaccine against the virus employing reverse vaccinology. The target candidate for the vaccine design is a surface protein called Hemagglutinin and viral protein called Nucleocapsid. The involvement of bioinformatics in the form of immune information has made it easier for the development of the vaccine .the use of online webservers like IEDB, Vaxijen , Toxinpred, Ifn gama, Haddock and the use of databases like NCBI, BLAST P , PDB , Uniprot, itasser, ROBETTA, CASTP, SPDBV, DISCOVERY STUDIO for the visualisation of the structures , then the use of Gromacs for simulation ,further to make the vaccine much better the use of differential gene expression can be done to specifically identify proteins for the development of even better vaccines . Using the selected epitopes, a chimeric vaccine construct was constructed with the peptides by linking the peptides with the GPGPG linker. These methods provide a path for the development of viral vaccination.

Keyword: paramyxoviridae, Hemagglutinin, Nucleocapsid, Gromacs, viral vaccination

BBN-PP-08

Evaluation of Antioxidant and Anti-inflammatory Potential of Crude Extract of *Zanthoxylum Armatum (*Timur) Seeds.

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Indian prickly ash *(Zanthoxylum armatum)* from Rutaceace family is an important medicinal plant that is widely distributed in India, from Kashmir to Bhutan.NSAIDs, or nonsteroidal anti-inflammatory drugs, are often used medications to reduce pain and inflammation. However, they can have a number of negative side effects that might harm internal organs. Herbal medicines are a complementary therapy that is commonly used to treat a variety of conditions with good efficacy and few negative or side effects. Persistent inflammation generates an enormous number of free radicals, which eventually create new inflammation. *Z armatum* seeds were acquired and utilised in this study for the phytochemical examination (DPPH Free Radical Scavenging assay) where Ascorbic Acid was used as a standard at various concentrations.The anti-inflammatory (MTT Cytotoxic assay) and its prospective effects with bioactivity *in vivo* (primary cells) were predicted using Raw 264.7 Murine Macrophage cell line. The ethanol extract from Indian prickly ash seeds were found to contain a number of steroids, and flavonoids with the ability to treat a wide range of illnesses.To further utilise this plant in medication development, more *in vitro* and *in vivo* research needs to be done.

Keywords: *Zanthoxylum armatum,* DPPH, antioxidant, anti-inflammatory.

BBN-PP-09

Antimicrobial and Phytochemical Properties of *Lantana camara*

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Lantana camara (also known as common lantana) is an evergreen shrub found growing in the tropical climates across the globe and is known for its salt tolerance that belongs to the family Verbenaceae that is widely spread like a weed or invasive. This plant is also known for its medicinal value that helps in curing wounds and various diseases (folk medicinal preparations). In the past few decades, the scientists and researchers have studied about the chemical composition and the pharmacological properties of this plant along with various therapeutic activities like antioxidant, antibacterial, antipyretic, larvicidal, insecticidal, antimicrobial, wound healing and antihyperglycemic activities. Research studies indicate lantana for the presence of several chemical compounds in different parts of the plant, including flavonoids, alkaloids, phenols, tannins, saponin, steroids, proteins, tri-terpenoids, catechins, glycosides and reduced sugars. The current research study focused on the phytochemical properties and antimicrobial activity of *Lantana camara* leaf extracts, both qualitatively and quantitatively. Various leaf extraction methods were performed and assessed for antimicrobial activity. Growth inhibition test was performed for both gram-negative and gram-positive bacteria on nutrient agar media. Maximum inhibition was observed with gram positive bacterium from chloroform extracted samples. Highest amounts of steroids followed by similar amounts of alkaloids and glycosides and lesser amounts of terpenoids, phenols, saponins, and flavonoids were recorded upon phytochemical analysis. Future research studies on revealing the preparation of nanoparticles from different parts of the plant would help in better understanding of drug delivery through nanoparticles.

Keywords: *Lantana camara*, secondary metabolites, antimicrobial activity, phytochemical properties, High performance liquid chromatography(HPLC).

BBN-PP-10

Global Challenge of Antimicrobial Resistance (AMR) - A Never Ending Burden

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Emergence and spread of antimicrobial resistance (AMR) are considered as a foremost public health hazard leading to increased morbidity, mortality, and health care expenditure. Antimicrobial resistant pathogens currently cause about 700,000 deaths worldwide every year. If serious action is not initiated now, the World Health Organization (WHO) has accredited, this number is estimated to rise to 10 million deaths by 2050 especially in low-income countries such as Asia and Africa. WHO has prioritized the multidrug resistance (MDR), especially the burden of six pathogens, the so called ESKAPE organisms namely *Escherichia coli*, *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Acinetobacter baumannii*, *Pseudomonas aeruginosa*, and *Enterobacter* contributing to the burden of AMR. The attainment of antimicrobial resistance genes (ARGs) by pathogens, their MDR property, decline in discovery of new antibiotics by R&D from pharmaceutical companies, overuse, misuse and indiscriminate use of drugs, prolonged hospital stay has resulted in selective pressure all contributing to AMR. Emerging AMR has reduced the treatment options for serious infections caused by Methicillin Resistant *Staphylococcus aureus* (MRSA), Vancomycin Resistant Enterococci (VRE), Carbapenem resistant Enterobacteriaceae (CRE), amplified disease burden and increased death rates, thereby necessitating a coordinated global response for AMR surveillance. Various international and national approaches have recommended action plans to mitigate AMR by prudent use of drugs and following One Health approach which means that human health, animal health and environment sectors are interconnected and have equal responsibilities and strategic actions in combating AMR.

Keywords: Antimicrobial resistance, multidrug resistance, one health approach, WHO.

BBN-PP-11

Herbal Remedies for Women's Health: Harnessing the Power of Medicinal Plants in Gynaecological Care

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Gynaecological disorders affect millions of women globally, posing significant challenges to healthcare systems and individual well-being. In recent years, there has been a growing interest in natural remedies, particularly medicinal plants, as alternative or complementary treatments for these conditions. This review aims to provide a comprehensive overview of the efficacy and safety of medicinal plants commonly used in the treatment of various gynaecological disorders.

Through a systematic literature search, we identified studies reporting on the therapeutic effects of medicinal plants in the management of conditions such as menstrual disorders, menopausal symptoms, polycystic ovary syndrome (PCOS), endometriosis, and pelvic inflammatory disease (PID), among others. The review examines the phytochemical composition and pharmacological mechanisms of action of these plants, highlighting their potential in alleviating symptoms and improving overall gynaecological health.

Several medicinal plants have demonstrated promising results in clinical trials and experimental studies, exhibiting anti-inflammatory, analgesic, hormone-modulating, and antioxidant properties. Examples include *Vitex agnus-castus* for menstrual irregularities, *Angelica sinensis* for menopausal symptoms, *Cimicifuga racemosa* for hot flashes, and *Curcuma longa* for endometriosis-associated pain. Moreover, many of these plants offer advantages such as affordability, accessibility, and fewer adverse effects compared to conventional treatments.

However, challenges remain, including standardization of herbal preparations, quality control, and potential herb-drug interactions. Further research is warranted to elucidate the optimal dosages, formulations, and long-term safety profiles of medicinal plants in gynaecological practice. Integrating traditional knowledge with modern scientific approaches holds promise for advancing women's healthcare and improving outcomes for those with gynaecological disorders.

Keywords: Gynaecological disorders, natural remedies, anti-inflammatory, analgesic.

BBN-PP-12

Identification Of Compound Having Antioxidant Properties in *Piper Chaba*

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The plant extracts belonging to the family Piperaceae have been used traditionally to cure a variety of ailments, including cough, cold, throat infections, intermittent fever, dysentery, stomach aches, worms, and piles. These plant extracts have pharmacological potential since they contain metabolites such as phenolics, alkaloids, flavonoids, carotenoids, and terpenoids. The plants have been used for various health benefits, which have been recognized in both traditional and modern medicine. The bioactive compounds were identified after investigating a few of the species of *Piper*, viz., *Piper chaba*, *Piper nigrum, Piper retrofractum, Piper betle* and *Piper longum.* The methanol extracts of *Piper chaba* showed the highest antioxidant activity compared to the other *Piper sps*. *Piper chaba* exhibited high DPPH, DMPD and FRAP antioxidant activities, indicating its antioxidant potential. Plant samples were analysed using gas chromatography - mass spectrometry (GCMS), and distinct peaks were identified and confirmed by total ion chromatography (TIC). The therapeutic characteristics of plants selected for GC-MS analysis were analysed based on the presence of Benzene propanoic acid compound which has antifungal, antibacterial and antioxidant properties. Therefore, the present study aimed to isolate Benzene propanoic acid by TIC method from *Piper chaba* which may be used to treat various diseases.

Keywords: Bioactive compounds, Total ion chromatogram, Anti-oxidants, GC-MS analysis.

BBN-PP-13

Inhibition of Fructosyltransferase Enzyme (FTF) from *Streptococcus mutans* Using Plant Extracts for Dental Caries Control

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Dental caries, a widespread oral health issue, is primarily attributed to *Streptococcus mutans* and its virulence factor, Fructosyltransferase (FTF) enzyme. This study focuses on isolating, characterizing, and inhibiting FTF enzyme activity as a novel approach to caries prevention.

Thirty clinical isolates of *S. mutans* were screened for FTF production, among which, the strain SM-18 exhibited the highest FTF activity. Using 16S rRNA sequencing, SM-18 was identified and deposited in the NCBI gene bank (Accession: OP848246). Crude FTF enzyme was extracted from SM-18 and purified via Sephadex G75 gel filtration, revealing stability and a molecular weight of 65 kDa. Enzyme optimization studies demonstrated optimal activity at pH 6.9 and 40°C, yielding 1090.24 U/ml and a specific activity of 1.23 U/mg. Furthermore, five medicinal plant extracts were evaluated for FTF inhibition. *Nothapodytes nimmoniana* and *Glochidion ellipticum* showed significant inhibition, attributed to their high phenolic and flavonoid content. Methanol extract of *N. nimmoniana* displayed potent inhibitory effects with IC_{50} values of 50.57 mg/ml, promising for caries prevention. This research highlights the potential of targeting FTF enzyme activity from Streptococcus mutans which could be used as a safe alternative to synthetic inhibitors. The findings contribute to the understanding of dental caries pathogenesis and offer insights into novel therapeutic interventions for oral health management.

Keywords: Fructosyltransferase**,** *Streptococcus mutans*, Dental caries, Inhibition

BBN-PP-14

Microplastics and Nano Plastics

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Plastic consumption has not only transformed modern life but has also led to a profound global crisis of environmental pollution. Over the past 50 years, plastics have become ubiquitous in daily use, underpinning a throwaway culture that contributes to major environmental hazards. Despite significant advancements in plastic production, a staggering 79% of manufactured plastic ends up in landfills, where its resistance to natural decomposition leads to the accumulation of microplastics (MPs) and nanoplastics (NPs) in ecosystems. The environmental impact of MPs and NPs is compounded by their persistence as organic pollutants, posing long-term threats to ecosystems and human health. Studies highlight the harmful effects of synthetic plastic fibers, which degrade slowly and can persist for extended periods, releasing toxic chemicals into the environment. Common plastic polymers like LDPE, HDPE, PVC, PS, PP, and PET contribute substantially to this crisis, necessitating urgent management strategies to mitigate their environmental impact. MPs and NPs have been found to exert serious impacts on both environmental and public health through polluted environments, emphasizing the need for comprehensive research into exposure routes and toxic effects. Exposure to MPs and NPs occurs through various pathways, including ingestion of contaminated water and food, inhalation of polluted air, and skin contact with contaminated sources. These exposure routes highlight the widespread presence of plastic pollution and its potential consequences for human health. Addressing the complex challenges posed by plastic pollution requires interdisciplinary efforts, including research, policy development, and innovative waste management strategies. Urgent action is needed to minimize the environmental and health risks associated with plastic consumption and disposal, ensuring a sustainable future for generations to come.

Keywords: Plastic consumption, Environmental impact, Nanoplastics, Microplastics, Plastic pollution.

BBN-PP-15

Screening of Potential Natural Compounds as Potential Drugs Against Hepatitis C Virus

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Hepatitis C Virus (HCV) is a global health concern, chronically infecting over 70 million people worldwide. The primary target site for the HCV replication is the liver. If it is left untreated it might later cause chronic hepatitis, hepatocellular carcinoma and other liver complications. In spite of advancements in antiviral therapy, current medicines are limited by adverse side effects and expensive costs, emphasizing the importance for alternate therapeutic approaches. Over the past decades, the natural compounds extracted from plants such as flavonoids, alkaloids and polyphenols have attracted attention as possible sources of antiviral medicine for HCV. These compounds work against viruses in a variety of ways, including inhibiting viral entrance, replication, assembly and release. Hence our present work focuses on specific HCV proteins potential drug targets include the NS5B polymerase, NS3/4A protease, entry receptors like CD81, and core proteins and virtual screening of Several plant-derived natural compounds against HCV drug targets. Our *In silico* analysis results reveals that silymarin and silybin, flavonoid that are extracted from the seeds of milk thistle *(Silybum marianum*) can interact with the targets. They are the direct acting antivirals that have shown inhibitory actions on entry of the virus, RNA and protein expression and HCV replication. In addition, other plant derived compounds, including gallic acid from sea lavender, Ladanein from horehound, Epigallocatechin-3-gallat (EGGC) from tea plant and curcumin from the rhizome of turmeric have shown encouraging antiviral results against HCV via a variety of mode of action. Thus, our study revels natural compounds as potential antiviral activity against the HCV and these substances has enormous therapeutic promise due to their variety of modes of action and possible combination with current treatments.

Keywords: Hepatitis C virus, NS5B polymerase, *Silybum marianum,* Curcumin.

BBN-PP-15

Screening of Potential Natural Compounds as Potential Drugs Against Hepatitis C Virus

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Hepatitis C Virus (HCV) is a global health concern, chronically infecting over 70 million people worldwide. The primary target site for the HCV replication is the liver. If it is left untreated it might later cause chronic hepatitis, hepatocellular carcinoma and other liver complications. In spite of advancements in antiviral therapy, current medicines are limited by adverse side effects and expensive costs, emphasizing the importance for alternate therapeutic approaches. Over the past decades, the natural compounds extracted from plants such as flavonoids, alkaloids and polyphenols have attracted attention as possible sources of antiviral medicine for HCV. These compounds work against viruses in a variety of ways, including inhibiting viral entrance, replication, assembly and release. Hence our present work focuses on specific HCV proteins potential drug targets include the NS5B polymerase, NS3/4A protease, entry receptors like CD81, and core proteins and virtual screening of Several plant-derived natural compounds against HCV drug targets. Our *In silico* analysis results reveals that silymarin and silybin, flavonoid that are extracted from the seeds of milk thistle *(Silybum marianum*) can interact with the targets. They are the direct acting antivirals that have shown inhibitory actions on entry of the virus, RNA and protein expression and HCV replication. In addition, other plant derived compounds, including gallic acid from sea lavender, Ladanein from horehound, Epigallocatechin-3-gallat (EGGC) from tea plant and curcumin from the rhizome of turmeric have shown encouraging antiviral results against HCV via a variety of mode of action. Thus, our study revels natural compounds as potential antiviral activity against the HCV and these substances has enormous therapeutic promise due to their variety of modes of action and possible combination with current treatments.

Keywords: Hepatitis C virus, NS5B polymerase, *Silybum marianum,* Curcumin.

BBN-PP-17

A Novel Strategy to develop Vaccine against Epizootic Hemorrhagic Disease in Cattle by using Immuno-informatics Approaches.

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Epizootic hemorrhagic disease (EHD) is Viral disease that primarily affects wild and domestic ruminants. This is caused by epizootic hemorrhagic disease virus (EHDV) which belongs to the *Orbivirus* genus. The common symptoms of EHDV infection in cattle is fever, lethargy, loss of appetite, Respiratory Distress, Excessive salivation, hemorrhagic symptoms, Oral lesions etc. EHDV disease have been found to be associated with enormous economic impacts affecting the global livestock industries in different countries like North America, Asia, Africa, and Oceania, showing significant morbidity and mortality. Therefore, requiring adequate attention towards EHDV prophylaxis. Currently, there are no effective treatment option is available for this disease in cattles. Hence, we are trying to design an efficacious multi-epitope vaccine candidate targeting the different EHDV serotypes by utilizing immune-informatics technology. To design the vaccine, antigenic epitopes (B-cell, cytotoxic T-lymphocyte (CTL), and helper T-lymphocyte (HTL) epitopes) of viral proteins were identified against BoLA allele population. The best predicted epitopes are selected and conjugated using suitable adjuvants, linkers for inducing the immune-response in Cattles. Followed by the 3D modelling, refinement, validation of ligand (vaccine construct) and receptor (bovine TLR4) and molecular docking and molecular dynamic simulation are in enduring phase to validate their stable interactions. We are diligently working to develop an effective prophylactic remedy for EHDV, aiming to lay the groundwork for further in-depth research studies.

Keywords: EHDV, Immuno-informatics, Antigenic Epitope, Toll-like Receptor, Hemorrahgic symptoms, Molecular Dynamic Simulation.

BCG-OP-01

Bodyguard, A Gene Involved in Cutin Biosynthesis in *Arabidopsis Thaliana*, Possesses *In Vitro* Lipid Biosynthetic Activities

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Cuticle is the topmost layer in the epidermal cells in plants, just beneath the wax layer, which is involved in protection of the plant against water loss, salinity stress, and attack by insects. Cuticle is composed of 2 major layers – Cuticular proper and cuticular layer. Cuticular proper is embedded with intracuticular waxes and cuticular layer is composed of certain polysaccharides, apart from the main constituent of cutin. Biochemically, cuticle is composed of cutin and cutan. Cutin is that part of cuticle whose structure has been elucidated by depolymerization and also some information is available about its biosynthesis. Cutin is mainly composed of hydroxy lipids, wherein fatty acids, ω-hydroxy fatty acids (also dihydroxy and trihydroxy fatty acids), glycerol, dicarboxylic acid, fatty alcohols and aromatic acids are involved in the formation of a dendrimer or cross linked complex structure, stabilized by ester linkages between the hydroxyl group of one monomer and the carboxyl group of the other monomer. Thus, we can describe cutin to be the naturally occurring, longest, lipid polymer. Cutin biosynthesis is as hardly understood as its structure. But, there is some information available about the initial steps that lead to cutin biosynthesis. Studying cutin metabolism is of high commercial importance especially to agricultural scientists. Production of drought resistant and pathogen resistant plants has been the dream of many scientists. Therefore, it is the concern of a biochemist to provide the necessary knowledge regarding a strong cutin to the agricultural research groups.

For this purpose, we chose to study cutin metabolism by trying to identify the biochemical function of genes involved in cutin biosynthesis. Rani *et al* (2010) had proposed a pathway for cutin biosynthesis in *Arabidopsis thaliana*, wherein they predicted DCR (Defective in Cuticular Ridges) to be involved in the biosynthesis of hydroxy-TAG, by acting as a diacylglycerol acyltransferase utilizing hydroxy fatty acyl coenzyme A as the hydroxy-acyl donor. This article gave an alternate mechanism for the biosynthesis of cutin, wherein hydroxy-TAG apart from hydroxy-MAG can act as a precursor for cutin biosynthesis. The hydroxy-TAG formed can directly serve as a substrate for cutin biosynthesis by getting transported to the apoplast by ABCG transporters. Rani *et al.*, had predicted that BDG (BODYGUARD) may be involved as a hydroxy-TAG lipase which may release hydroxy fatty acids from TAG, which may be utilized for cutin biosynthesis in the apoplastic space, after its transport by ABCG group of transporters. Therefore, we chose to study the lipase function of BDG in order to understand its role in cutin formation and decided to study the effect of BDG on lipid metabolism, as cutin is a naturally occurring lipid polymer. Out of the 5 BDG genes in the BODYGUARD group, we expressed BDG1 and BDG2 in yeast cells. We checked for the growth pattern of these yeast cells

and found that BDG expression retards the growth of the cells. We then went on to study the neutral lipid profile. Both acetate labelling and microscopic analysis revealed a reduction in TAG levels and therefore the neutral lipid formation respectively, in the yeast cells expressing BDG. From this result, we tested BDG for a TAG lipase activity, which was found to be positive in these cells. Therefore, we concluded that the prediction of BDG to possess a TAG lipase function is indeed true. The lipase activity of BDG in *Arabidopsis thaliana* channelizes the hydroxy free fatty acids to the apoplast region for cutin biosynthesis, as predicted by the cutin biosynthesis hypothesis (6). However, since we have chosen yeast to be the model system for studying BDG expression, it is necessary for us to know the lipid fraction(s) to which the free fatty acids are being channelized. For this purpose, we analyzed the phospholipid fractions of the BDG expressing cells. We found that PE formation was enhanced in these cells. Based on this result, we performed Lysophospholipid acyltransferase assays, which revealed BDG1 to possess a LPEAT activity. This result co-related with the orthophosphate labelling experiment. Thus, we can conclude that the fatty acids produced by the TAG lipase activity of BDG are being channelized towards PE biosynthesis.

Further work needs to be done in understanding the roles of BDG3 and BDG4**.**

Keywords: depolymerisation, hydroxy-TAG lipase, diacylglycerol acyltransferase, Lysophospholipid acyltransferase assays, bodyguard (BDG1 and BDG2).

BCG-OP-02

Conquering Cancer with Gene Therapy

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This experimentation investigates the efficacy of gene therapy in causing apoptosis of cancer cells and methods to resolve the after effects of gene therapy. Cancer is the major ailment that screams the horror stridently, across the globe. Discovering methods to cure cancer completely has been the prime outlook of the medical community. Modern day science throws light on several processes through which one can be cured of cancer. One such method is gene therapy. In this procedure the defective gene is replaced by healthy and functional gene. The main cause of cancer is mutations in oncogene or tumor suppressor gene. Gene therapy can aid in replacing the mutant gene by priorly engineered 'Suicide Genes'. These genes cause apoptosis of cancer cells. But gene therapy has some fatal after effects. Therapy may cause allergic reactions, fatal immune responses, etc. In this study we explicate the effectiveness of gene therapy in curing the malady. We also comprehend some methods and physiologies required to treat cancer with after-effect-free gene therapy. This research is based around experiments conducted in this domain. We use data obtained by conducting surveys and interviews among scientists, doctors, faculty and research scholars from the scientific community. The results obtained elucidate the role of the 'suicide genes' in programming the death of cancer cells. The data obtained from interviews suggests some ideas to achieve after-effect-free gene therapy to alleviate cancer. This analysis demonstrates the vitality of gene therapy for the treatment of cancer. Thus, we explore the future of gene therapy in providing side-effect-free cure for dreadful ailment cancer.

Keywords: Gene therapy, Cancer, Suicide genes, apoptosis, interview.

BCG-PP-01

Fortified Foods Modulate Hyperglycaemia In Streptozotocin-Induced Diabetic Rats.

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Diabetic mellitus (DM) is a metabolic disorder and a major concern all over the world, including India. By 2040, India is going to be the hub for diabetics. DM is mainly caused by a shortage of insulin or inadequate insulin synthesis in the pancreas. Protein and other essential nutrient deficiencies further aggravate diabetic complications. Fortified food is one of the better options to manage diabetes effectively without side effects. In the present study, we have focused on studying the effect of fortified food containing the root powder of *Withania Somnifera (Ashwagandha),* which is known for its anti-diabetic effect. Two-month-old male albino Wistar rats, weighing about 120–140 g, were divided into control, diabetes, fortified food (FF), and diabetes + FF. Diabetes was induced by an IP injection of streptozotocin at 50 mg/kg b.wt. All groups received food and water ad libitum throughout the experimental period, i.e., 60 days. Results revealed that diabetic rats showed increased blood sugar levels with decreased body weight. Further, diabetic rats showed increased oxidative stress with decreased anti-oxidant status in plasma. Moreover, altered plasma sodium, potassium, calcium, creatinine, urea, uric acid, c-peptide, HbA1c, and insulin levels with elevated AST, ALP, ALT and LDH enzyme levels were noticed in diabetic rats compared to controls. Supplementation of FF to diabetic rats brought back these altered biochemical parameters to normal compared to diabetic rats. Food fortification with high protein, micronutrients and phytochemicals is the best option to manage diabetes. In conclusion, our results suggest that FF could be beneficial in the management of diabetes.

Keywords: *W.Somnifera*; Diabetes, Oxidative stress; Fortified Food

BCG-PP-02

Structural and Functional Characterization of RNA-directed RNA polymerase protein involved in Pathogenesis of *Nipah virus* using an In-silico method

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Nipah virus, a zoonotic pathogen of the Paramyxoviridae family, presents a substantial public health concern due to its high fatality rates and potential for outbreaks. Understanding its genomic and structural characteristics is crucial for elucidating its pathogenesis and informing preventive measures. RNA-directed RNA polymerase (RdRP) is a critical catalyst liable for catalyzing the replication of RNA.⁻This study aimed to develop antiviral by disrupting multiplication of virus by targeting the RNA-directed RNA polymerase protein by the use of various bioinformatics tools like BLASTp, ProtParam, Clustal Omega, etc for enumerating structural and functional analysis of protein. A 3D structure of RNA Directed RNA polymerase protein was generated using the Swiss model and validated using molecular modeling. 3D structure with a **Qmean value of 0.63± 0.05** was further validated with Errat (82.50%), verify3D, and Procheck (99.3% allowed region) found to be a good model. Further 3D model was used to determine active site using COACH-D and found active site with 209.959, 217.518,188.077 dimensions and involving (THR355, AGR238, VAL234, GLY237, AGR904, SER315, HIS358, SER903, ARG354, ASP233, LYS900, HIS9, LEU10) amino acids. With this active site, virtual screening of ligands for antiviral was performed using PyRX software, interacting with specific amino acids of the RNA Directed RNA polymerase protein. The top compound is Raltegravir with binding affinity score of -9.

Keywords: *Nipah virus*, RNA-directed RNA polymerase protein, Bioinformatics tools and Qmean.

BOT-OP-01

Designing Potential Inhibitors Against Human Papillomavirus 16 E6 Protein: Integrating Fragment-Based Approaches with Molecular Dynamics Simulation

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Human papillomavirus (HPV) infection, a widespread sexually transmitted disease is associated with the formation of a complex between the E6 protein and E3 ligase E6-associated protein (E6AP), leading to the degradation of p53 and subsequent tumorigenesis. Disrupting the E6-E6AP interaction is a promising therapeutic strategy aimed at reactivating p53 function to induce apoptosis in HPV-transformed cells. Additionally, the unique structure of the E6 pocket presents an opportunity to enhance binding affinity against viral proteins related to cellular components. Consequently, targeting the E6 pocket protein has emerged as a key focus for drug development against HPV infection and its oncogenic effects.

In this study, we aimed to design potential small molecule inhibitors against the HPV E6 protein using a fragment-based approach. Twenty-six natural HPV inhibitors were scrutinized from existing literature, with Luteolin chosen as the reference compound. Utilizing fragment script and BREED of Schrodinger software, novel inhibitor molecules were designed from these compounds. Docking of resulting 817 novel molecules into the active binding site of HPV E6 protein yielded ten compounds with significant binding affinities compared to Luteolin. Compounds Cpd5, Cpd7, and Cpd10 emerged as the most potent inhibitors of HPV16 E6P, and demonstrated non-toxicity, high gastrointestinal (GI) absorption, and favourable drug-likeness scores. Molecular dynamics (MD) simulations over 200 ns confirmed the stability of complexes formed by these compounds. Collectively, our findings highlight Cpd5, Cpd7, and Cpd10 as promising lead molecules for the development of new drugs targeting HPV-related diseases.

Keywords: Human papillomavirus, E6 protein, small molecule inhibitors, fragment-based approach, MD simulation

BOT-OP-02

DNA Gyrase Inhibition and Antimicrobial Potentials of Fluoroindolines

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Presenting here the vanillin substituted fluoroindolines prepared from eco-friendly solvents and catalysts by the condensation of substituted benzaldehydes with 5–fluoro-oxindole in presence of pyrrolidine as reagent is presented here,pyrrolidine is nothing but a by-product of the reaction in water, isolated by mere filtration with excellent yield and high purity without purification.The eco-scale calculation indicated that the process is green chemistry with a **96.75 % eco-scale score**. All synthesized compounds were characterized by IR, NMR (^{1}H, ^{13}C, ^{19}F) and Mass spectra (LCMS, HRMS). Current studies have shown a remarkable outcome of DNA gyrase inhibition on the development of atherosclerosis in animal models. The significant role for DNA gyrase inhibitors in reducing escaping mechanism of bacteria through negative supercoiling. DNA gyrase ability of all compounds was tested using a DNA-gyrase competitive inhibition-based assay. Mode of interaction and preliminary therapeutic efficacy of all compounds was assessed by molecular docking, MD simulations and DFT & ADMET calculations. Cytotoxicity of the compounds were assessed in macrophages. The structure-activity relationship was established by comparing all experimental as well as *in silico* analysis. In the results, excellent DNA gyrase (96.25±2.14 % inhibition and IC_{50} 0.004 μM) of compound **5a** was correlated with the molecular docking results (IC_{50} 0.0039 μM). In conclusion, it is highly possible that the blood pressure effects of DNA gyrase-inhibitors could play a role in the anti-microbial effect shown by these compounds.

Keywords: Anti-microbial; Drug design; Green Chemistry; Molecular docking; DNA gyrase

BOT-OP-03

Genetic diversity of Drosophila in Thirthahalli (Kuvempu Forest Nursery)

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Study of Drosophila species diversity is valuable for several reasons. In the present study, a total of 5 species from Kuruvalli Forest Nursery of Thirthahalli taluk belonging to genus Drosophila were identified. The identified species were *Drosophila ananassae, D. bipectinata, D. hydei, D. malerkotliana and D. yakuba* in Kuruvalli Forest Nursery during three different seasons i.e., summer, monsoon and post-monsoon. *Drosophila bipectinata* was found to be most abundant species and *Drosophila hydei* found to be least species during all the seasons in Kuruvalli Forest Nursery. Highest number of flies were found to be during monsoon and post monsoon, whereas during summer least number of flies were found, this might be due to various factors like temperature fluctuation, availability of food, variation in humidity. The population density was varied in all the three different seasons. The least population density was found during summer season. Exploring the diversity provides insights into evolutionary progress, genetic variations and adaptations.

Keyword: - Temperature fluctuation, *Drosophila hydei,* variation in humidity, availability of food, population density

BOT-OP-04

Identification of Diagnostic Biomarkers for Lung Adenocarcinoma Based on Differential Gene Expression and Pathway Analysis

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Bioinformatics analysis. The gene expression profiles of LUAD were obtained from the TCGA database. The edge R software package was used to screen the differentially expressed genes between breast LUAD patients and normal samples. Protein-protein interaction among the upregulated genes is done to construct the network and obtained top 10 hub genes from the network. The function The study aimed to identify potential biomarkers for lung adenocarcinoma (LUAD) through and pathway enrichment analysis and GO of these genes revealed significant enrichment of functions and pathways. The potential diagnostic markers of LUAD were obtained by performing expression analysis of the hub genes. Finally, these markers were used to construct the diagnostic prediction model of LUAD, and the predictive ability of the model and the diagnostic ability of the markers were verified by internal and external data. 4715 differentially expressed genes were obtained, 1258 are upregulated based on logFC>1. Protein-protein interaction network in constructed with 654 nodes and 1800 edges and 10 hub genes IL6, PECAM1, PPARG, CDH5, CD36, EDN1, BDNF, AGTR1, CAV1, AGTR2 obtained from Cytoscape with cytohubba plugin. IL6, PPARG, CDH5, CD36, EDN1, BDNF, AGTR1, CAV1 these genes are identified as the potential biomarkers for LUAD. These findings suggest that further research on these genes could provide a better understanding of their role in LUAD and their potential as biomarkers for diagnosis or prognosis. The study highlights the utility of bioinformatics approaches in identifying candidate biomarkers for cancer.

Keywords: LUAD, differentially expressed genes, Biomarkers, Bioinformatics.

BOT-OP-05

Metagenomic Analyses of Intestinal Microbiome in Lactose Intolerant Mice Diarrhea Model

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Probiotics have attained significant interest in recent years as a result of their gut microbiome modulation and gastrointestinal health benefits. Numerous fermented foods contain Lactic acid bacteria (LAB) with *GRAS* grade and probiotic bacteria. The current study used a mice model to assess the gastrointestinal symptoms caused by milk and dairy products, as well as the lactose intolerance level using Balb/c mice were orally administered with β-galactosidase producing probiotic bacteria in order to alleviate lactose intolerance condition. The results were very promising, where reduced total feces weigh, with slower intestinal motility and efficiently alleviated diarrhea symptoms within 6 h of lactose challenge. Next generation sequence analysis was performed using intestinal content of model treated and confirmed the existence of the dominant phyla of the gut microbiome in mice are Bacteroidetes, Firmicutes and Proteobacteria. Probiotic bacteria has a positive impact on the regulation of intestinal microbial diversity in the mice system and reflects that the intestinal microbiota as dynamic perhaps promoted as therapeutic probiotics food development at industrial scale.

Keywords: Probiotics, LAB, Lactose intolerance, Next generation sequence, Metagenomics

BOT-OP-06

The Effect of Ultraviolet- C Radiation on *Drosophila Melanogaster*

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Ultraviolet (UV) radiation is recognized for its capacity to modify the structure of DNA and impair cellular function across all forms of life. UV radiation, particularly in the Ultraviolet-C (UVC) spectrum (100-280 nm), is known to induce DNA damage and various physiological responses in organisms. UV-C is largely absorbed by the atmosphere without posing significant risks to human health. However, there is a rise in man-made UVC radiation, utilized as a substitute for chemical pesticides, insecticides, and germicides, and as a catalyst for the breakdown of harmful contaminants in water. Research reveals that man-made UVC radiation effectively targets arthropods at their embryonic stage, but its impact on other developmental phases remains largely unexplored. The present work was attempted to investigate the impact of UVC exposure on the morphology and reproduction of *Drosophila melanogaster.*

The experimental groups of adult *Drosophila* flies were subjected to different durations of UVC exposure, ranging from short-term to long-term using a controlled laboratory setup. Variations were observed in the size, reproductive capacity and developmental stages of *D. melanogaster* in response to UVC exposure. Specifically, flies subjected to longer exposure to UVC radiation exhibited a marked increase in body size compared to those in control groups suggesting a potential disruption in normal developmental processes. Female flies subjected to longer exposure to UVC exhibited reduced fecundity, as evidenced by decreased egg production and hatching rates. Also, a developmental delay was observed in the various stages of life cycle.

The observed alterations in size, reproductive ability and developmental delay highlight the vulnerability of *D. melanogaster* to UVC radiation. Overall, this study provides valuable insights into the potential ecological consequences of environmental stressors like UVC exposure on insect populations, with implications for pest management strategies, agricultural practices, and environmental conservation efforts.

Keywords: Ultraviolet-C (UVC) radiation, DNA, atmosphere, arthropods, *Drosophila melanogaster*, genus , species, stressors.

BOT-PP-01

Alcohol Induced Hormonal and Metabolic Alterations in Plasma and Erythrocytes - A Gender Based Study

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This study aimed to understand the gender-specific alcohol-induced biochemical changes and TBARS association with the endocrine system. Human male and female subjects ranging from 35 ± 10 years old with an 8-10-year drinking history were included in the study. The results demonstrated that testosterone levels were lower in male alcoholics and higher in female alcoholics, as well as higher estrogen and cortisol levels in both genders. In addition, we found lower T3, T4, and thyroid-stimulating hormone (TSH) levels in alcoholics of both sexes. Furthermore, plasma TBARS, protein carbonyls, nitrite, and nitrate levels increased significantly with concomitant decrease in reduced glutathione (GSH), catalase (CAT), superoxide dismutase (SOD) and glutathione peroxidase (GPx) activities in both male and female alcoholics. Furthermore, erythrocyte lysate nitrite and nitrate levels membrane total cholesterol, phospholipid and cholesterol/phospholipid (C/P) ratio with lower total membrane proteins in both genders of alcoholics. SDS-PAGE analysis of erythrocyte membrane proteins revealed increased density of band 3, protein 4.1, 4.2, 4.9 and glycophorins, whereas decreases in spectrin (α and β) were observed in both genders of alcoholics. Besides, alcoholics of both sexes had a lower ability to resist osmotic hemolysis. Plasma TBARS was negatively correlated with testosterone, TSH, T3 and T4 in male alcoholics, moreover, estradiol and cortisol were positively correlated in males and females respectively. Female alcoholics may be more susceptible to osmotic hemolysis due to increased erythrocyte membrane lipid peroxidation with decreased antioxidant status, which results in an altered membrane C/P ratio and membrane protein composition.

Keywords: Alcohol, Erythrocyte Membrane; Gender, Hemolysis, oxidative stress

BOT-PP-02

Backtracking and Lorax-Seq

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For a cell to function properly, the genetic code in that DNA is copied down, or transcribed, by an enzyme called RNA polymerase to make a molecule called RNA. Often, the RNA is then translated into proteins the building blocks of life. There are myriad factors that determine which genes need to be turned on, such as the type of cell and its stage of development. The recent study published, in molecular cell describes a new found way by which cells control their genes called BACKTRACKING. It was initially thought to be a response to create breaks in the DNA, but its now being studied for its role in gene regulation. RNA polymerase is a ratchet machine that oscillates between productive and backtracked states at numerous DNA positions. The amount of backtracking (reversible sliding of the enzyme along DNA and RNA) varies from one to many nucleotides. Since its first description 15 years ago, backtracking has been implicated in a plethora of critical process in bacteria and eukaryotic cells. Backtracking is a process that takes place in living cells soon after RNA polymerase begins RNA synthesis or when it encounters any damaged DNA, in which RNA polymerase, instead of moving forward along the DNA as it reads a gene, shifts back and pauses. This halt then resolves and the enzyme can move ahead again churning out RNA.The technique long-range cleavage sequencing or LORAX-SEQ, developed by reads the RNA's code to determine which genes are prone to this apparent hiccup in transcription. This method is developed to better detect tracking events, and the technique has a very elegant method that very specifically picks out and identifies cases where there's been long backtracking.

Here we review the most fundamental roles of this phenomenon in controlling transcription elongation, pausing, termination, and the functional properties of the event backtracking process and a newly developed technique called LONG-RANGE CLEVAGE SEQUIENCING or LORAX-SEQ, a technique used to capture the RNA strands extruded in persistent backtracking.

Key Words : *Backtracking, RNA polymerase, LORAX-SEQ, Transcription*

BOT-PP-03

Emphasizing the Study of Ploidy Variation and Analyzing the Different Ecotypes in Wild *Cymbopogon Martini* using Flow Cytometry

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The study of ploidy variation in wild *Cymbopogon martini* (Roxb.) Wats of different ecotypes using flow cytometry offers insights into the genetic diversity and adaptation of this plant species across varied environments. Here is a concise summary of the key points:

The aim of the study is to assess ploidy variation (DNA content) in Cymbopogon martini populations from different ecotypes, which represent diverse geographical and environmental conditions. Fluorescence histograms generated by the flow cytometer are analyzed to determine the DNA content (ploidy level) of each sample. Ploidy levels among different ecotypes Compared. Ploidy variation (e.g., diploid, triploid, tetraploid) is observed among Cymbopogon martini ecotypes. Different ecotypes may exhibit distinct ploidy levels, potentially reflecting adaptation to specific environmental conditions. Ploidy variation in Cymbopogon martini suggests genetic diversity within the species, possibly driven by ecological factors.Understanding ploidy variation can provide insights into the adaptive potentially reflecting adaptation to specific environmental conditions. Ploidy variation in Cymbopogon martini suggests genetic diversity within the species, possibly driven by ecological factors. Understanding ploidy variation can provide insights into the adaptive potential and evolutionary dynamics of wild populations. This study contributes to the broader understanding of plant genetics and adaptation to diverse habitats. Findings may have implications for conservation efforts and crop improvement strategies involving Cymbopogon martini.

In summary, investigating ploidy variation in wild Cymbopogon martini using flow cytometry enhances our understanding of genetic diversity and ecological adaptation in this plant species, highlighting its evolutionary significance and potential applications in agriculture and conservation.

Keywords: ploidy variation, *Cymbopogon martini*, flow cytometry, genetic diversity

BOT-PP-04

Mutational Analysis of Covid 19 Variants and Phylogenetic Analysis

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SARS-CoV-2(COVID19) is the third most aggressive virus which causes severe acute respiratory syndrome and this is been the world dealing with since DEC 2019. Covid19 spreads rapidly and kills several people. It is multigenic and multifactorial disease with many genetic and environmental determinants. In the present study, we reviewed key mutations of all the variants of SARS-CoV-2 .Databases searched from Feb to Mar 2022 revealed that all the varients have 64 mutations and 5 deletions and depends on predisposing factors like age, male gender and geographical locations on which it depends its impact on infection of covid19. We have compared all the variants of covid19 spike protein sequences and residues were Identified.Further, sequence alignment and multiple alignment were done in order to know the particular mutational sequence analysis. A phylogenetic analysis of all the sequence are performed and has been compared to epidemiological data of covid19 variants, and also similar proteins in closest viral species similar to SARS-CoV-2 to evaluate the molecular epidemiology of relataed viruses and the pattern of virus spreads, the Interactions of Proteins with greater affinity for ACE2 (angiotensin 1 converting enzyme 2) of various Human receptors that codes for the proteins involved in coronavirus cell entry and fusion, and weaker affinity for CD47 were studied. The outcome of our study will help to provide Spike protein mutations and ACE2 Receptors interactions with the mutated virus variants.

Keywords: COVID-19, variants, mutation, protein sequence.

BOT-PP-05

Simplified Extraction Method for Sericin Protein from Silk Cocoon

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Sericin, a glycoprotein found in silk cocoons, has garnered attention for its diverse applications in various industries including cosmetics, pharmaceuticals, and biomaterials. Extracting sericin efficiently and cost-effectively is crucial for its widespread utilization. This abstract outline a simplified method for extracting sericin from silk cocoons, suitable for small-scale applications.

The extraction process involves several steps, beginning with the collection of silk cocoons and their degumming to remove the fibroin protein, degumming is achieved by boiling the cocoons. The extracted sericin sample was tested compared with commercially available sericin using different analytical techniques and it showed a good similarity. The simplified extraction method presented in this abstract offers several advantages, including ease of operation, minimal equipment requirements, and cost-effectiveness. Moreover, the use of environmentally friendly solvents and mild extraction conditions ensures the preservation of sericin's bioactivity and functional properties.

In conclusion, this overview highlights a straightforward approach for extracting sericin protein from silk cocoons, facilitating its integration into various industrial and biomedical applications. Further research focusing on process optimization and scalability is warranted to enhance the efficiency and feasibility of sericin extraction on a larger scale.

Keywords: Sericin, Silk cocoon, Extraction, Degumming, Filtration, Biochemical properties.

BWM-OP-01

Water-Wise Innovations: Revitalizing Coconut and Areca nut Cultivation for Sustainable Agriculture in Karnataka

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Our research is dedicated to revolutionizing farming practices in Arecanut and Coconut cultivation across Karnataka through the integration of sustainable techniques. We confront the pressing issues of water scarcity and outdated traditional methods head-on, advocating for the adoption of more effective and environmentally friendly strategies. Our proposed solutions encompass a comprehensive approach, including the implementation of zero cultivation methods, the introduction of cutting-edge irrigation techniques like propsed strategies and the utilization of abundant natural resources such as Arecanut husk, Neem and Beech tree powder, growing Gliricidia acts as bio-fertilizers. We prioritize the transition towards sustainable practices such as live mulching and the cultivation of beneficial cover crops, with the overarching goal of enhancing soil fertility and optimizing water retention capabilities. Through meticulous comparative analysis, we meticulously outline the extensive advantages of these modern techniques over traditional approaches, demonstrating their superiority in terms of productivity, cost-efficiency, yield optimization, and overall sustainability. Furthermore, our study sheds light on the significant socio-economic benefits of embracing these sustainable methodologies. By empowering farmers with the tools and knowledge to achieve self-sufficiency and resilience, we aim to catalyze greater economic stability and bolster community well-being.In essence, our research underscores the critical imperative of embracing sustainable farming techniques and efficient irrigation methodologies to bolster the resilience and self-sufficiency of Arecanut and Coconut cultivation in Karnataka. Through this holistic and forward-thinking approach, we aspire not only to address immediate agricultural challenges but also to contribute towards the establishment of a more sustainable and prosperous agricultural sector for present and future generations alike.

Keywords: Arecanut , Coconut, Gliricidia, bio-fertilizers, zero cultivation, socio-economic

BWM-OP-02

Phenomics-Based Assessment of Sugarcane Genotypes Resilience to Soil Moisture Depletion and Biostimulant Application

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The occurrence and magnitude of abiotic stresses are increasing due to global climate change. Among the various abiotic stresses, the drought, featured by depleting soil moisture, is major limiting factor for productivity of crops including sugarcane. In addition, it is necessary to minimize water consumption in sugarcane, the major driver of rural economy of the nation. This can be achieved through both the genetic improvement and the resource management approaches. In this context, bio stimulants are gaining importance due to their potential to alleviate soil moisture stress in plants. Hence, experiments were planned to employ high throughput phenomics protocols to assess the threshold of soil moisture tolerance of sugarcane during soil moisture depletion in three genotypes of sugarcane viz., Co 86032, CoM0265, VSI 08005. Images acquired through high resolution (visible range), thermal (IR) and Near InfraRed (NIR) imaging systems at National Plant Phenomics Facility at ICAR-NIASM were analyzed to assess stress responses of shoots. Image parameters that could differentiate the treatment effects were selected to determine the threshold of stress tolerance and to identify promising bio stimulants. The phenomics protocol could help in identifying the most resilient genotype and bio stimulant non-invasively. Chitosan and Silixol, used as bio stimulants, could help in enhancing threshold level of tolerance by retaining high tissue water content and absolute green area in plant. This study suggested that the green leaf area, brown leaf area, dry leaf area and yellow leaf area out of more than forty image parameters assessed, could reveal the threshold of stress tolerance of different genotypes of sugarcane and also the efficacy of bio stimulants in alleviating moisture stress at initial growth stages.

Keywords: Phenomics, sugarcane, biostimulants, phenotyping, water stress

BWM-PP-01

Azolla as a Metal Bioindicator in Phytoremediation

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The removal of pollutant toxins with the application of living organism like plants is a very promising approach popularly referred to as phytoremediation.

Azolla, a water fern, has emerged as a notable agent in this ecological cleanup especially in sequestering hazardous elements like Cadmium. Different species of Azolla show varying efficiency properties in metal elimination. The current review work focuses on comparing the efficacy of various Azolla spp. as a potential bioindicators for metal pollutants. Most of the Azolla species have their inherent limitations with tolerance threshold of varying cadmium concentrations of maximum 0.01mg/L. Hence, to optimize this concentration limit, series of experiments and research continued to attribute promising effect of phytoremediation by Azolla.

Few species like *A.microphylla* expressed a predominant nature in eliminating cadmium while *A. pinnata* was efficient in removing chromium and nickel. In order to conserve the plant's robustness and attain ideal intake of Cadmium from the solution, it has been revealed that the Mosquito Fern plants are advantageous for uptaking of Cadmium from nutrient rich water sample, when the sample solution is collected every alternate week. In similar way, studies showed that *Azolla pinnata* works efficiently in Phytoremediation of Industrial Effluents that contain heavy metals such as Cadmium and Mercury (Hg_4), whereas *Azolla filiculoides* works efficiently in clusters and fixed-bed reactors to eliminate Zn(II) and Ni(II). It has been shown by the plants to accumulate Copper, Zinc. Nickel and Cadmium which result in genes for Phytochelatin synthase and Metallothionein to be expressed. These genes are associated with metal purification or detoxifications. Hence, various research findings highlight Azolla's efficacy in bioremediation, particularly in the removal of Cadmium from wastewater and industrial effluents.

Keywords: Phytoremediation; Azolla; Metallothionein

BWM-PP-02

Bio-Weedicide Activity of the Plant Derivative

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Weeds are undesirable plants which interfere with the land and resources and therefore affect desired vegetation yield. Currently weeds have been managed by employing synthetic weedicides chemicals. These chemicals have a negative impact on the environment through accumulation in soil and water, in addition to their effect on biological diversity.

A study was undertaken to evaluate the activity of the aqueous, ethanol and Methanol extract of Parthenium. The study comprised of complete plant extract of different solvents (Aqueous, ethanol and Methanol) of different concentrations and their impact on germination and inhibition of seedling growth. The results from using Parthenium extract of different solvents gave inhibition at different levels of different concentrations. While the concentration of 2.5% gave the lowest inhibition rates of germination of plant extracts of different solvents. The current study indicates the possibility of using natural products of plant origin as alternatives to chemical herbicides (weedicide) as one of the means of biological control to reduce environmental pollution.

Keywords: Biological diversity, Germination, Methanol extract, Parthenium, Weedicides.

BWM-PP-03

Bio-Enzymes Production and Their Application in Antimicrobial, Natural Disinfectant, Waste Water Treatment and Biofertilizer

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A lot of waste is generated from day-to-day life activities categorised into several types based on the degradation ability. There is a very big opportunity and challenge to remediate the dumped waste in the marketing places and dump yards. Serious concerns over the management of the organic wastes with recovery of material and reuse is the key strategy and is vital for maintaining the energy cycle. Bio-enzymes are organic solutions with easy preparations and minimal requirements can utilize the organic waste as initial material. In this view, Bio-enzyme preparation was attempted using locally available organic waste, jaggery and yeast. The objectives of the experiment were to determine antimicrobial activity, suitability as natural disinfectant, efficient waste water treatment agent and to produce effective biofertilizer. Various combinations of fruit peel waste, fragrance enhancing flowers, jaggery and yeast yielded with light to dark yellow colour, pleasant odour, clear solution, varied pH range, protein content, carbohydrate levels, amylase activity, protease activity, lipase activity, catalase activity, BOD, and antimicrobial activity. Antimicrobial activity was assessed in terms of inhibition zone using *S aureus, B subtilis*, and *E coli.* Bio-enzyme extract of banana peel showed the highest antimicrobial activity to *S. aureus*. Bio-enzyme extract obtained from mango peel showed maximum inhibition zone against *E coli*. The Bio-enzyme extract obtained from the papaya peel has the maximum antimicrobial activity to *B subtilis* with an inhibition zone of 1.4 cm. The results obtained in the study identified that Bio-enzymes have both biocatalytic and pathogen inhibiting property. Additionally, it has the potential to enhance the stability of sludge by removing the solids and suppressing the activity of microbes. Production of these Bio-enzymes are cost effective, easy to use, and environment friendly driving the topic to further detailed study for research community yielding innumerable products with added benefits.

Keywords: Organic waste, Bio-enzyme, antimicrobial agent, biofertilizer, waste water treatment

BWM-PP-04

Optimization Of Floral Waste Management and Their Value Additionfor Sustainable Development

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Floral waste generated from various sources such as flower shops, religious ceremonies and horticultural activities poses both environmental and economic challenges. The implementation of decentralized waste management systems has created challenging conditions in emerging nations like India. About 40–50% of the Nation's total solid waste is organic in nature and contributes to soil, water and air pollution as well as health issues for the people. This is because of the many cultural, social and religious activities that create waste in the country. In the present study, efforts have been made to find out the reasons for large quantity of floral waste and its impact on environment and economy, current floral waste management practices and value added products. The study proposes optimization strategies that encompass efficient collection, transportation and disposal methods, emphasizing the reduction of environmental footprint. One of the main priorities for sustainable development is waste avoidance. It is the initial action that keeps a material from becoming garbage. The approach maximizes resource use while lowering the overall quantity of trash produced as well as its negative effects. Through innovative processes such as composting, bioenergy production and extraction of bioactive compounds, floral waste can be transformed into valuable products. By optimizing waste management practices and addition of value to floral waste helps to achieve sustainable development by minimizing environmental impacts, fostering economic growth and promoting social well-being. It is also expected to provide valuable insights for policymakers, environmentalists and entrepreneurs seeking to create a more sustainable and circular economy.

Keywords: Floral waste, Value addition, Sustainable development, Economic growth.

BWM-PP-05

Harnessing Algae for Water Purification: A Holistic Approach for Wastewater Treatment to Commercial Reusability

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The water scarcity and pollution are significant global challenges that requires innovative solutions for sustainable water management. The proposed research is the comprehensive process of utilizing algae for water purification followed by multiple steps i.e. traditional methods and algal based purification for subsequent extraction of purified water for commercial applications. The process integrates traditional filtration methods with algae-based purification, emphasizing the economic and environmental benefits of reusing purified water. By combining these techniques, we can strive to address water scarcity, contamination, and to promote water sustainability. These methods of water purification techniques aiming to promote sustainable practices and mitigate the global challenges.

Keywords: Algal-based purification, Traditional filtration, Sustainability, Global challenges, water scarcity.

BWM-PP-06

Identification of Chicken Feather Waste (CFW) Degrading Novel *Paenibacillus koreensis* YC300 from Poultry Soil

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Poultry has a prominent role in the modern food industry contributing many nutritious products. A major byproduct of the poultry industry is chicken feather waste (CFW) which is rich in keratin and is generated in excessive amounts from poultry farms. The poultry industry thus generates huge quantities of solid CFW resistant to degradation leading to serious environmental pollution. It is possible to harness the capacity of keratinases from natural sources to degrade insoluble keratin present in CFW. The current communication outlines the isolation and screening of CFW-degrading bacteria from poultry soil. The potent keratin-degrading bacterium was enriched on keratin agar medium and identified as *Paenibacillus koreensis* YC300 by 16S rRNA gene and phylogenetic studies. Fourier transform infrared spectroscopy analysis was studied for the structural and mechanism analysis of feather degraded during keratinase production. The effect of temperature, pH, and feather concentration was studied. The maximum keratinase activity was observed at 45°C, at pH 7. *Paenibacillus koreensis* YC300 shows maximum enzyme activity of 138U/ml at the 5th day. This is the first report on CFW degradation by *Paenibacillus koreensis* YC300.

Keywords: poultry feather waste, keratinolytic bacteria, 16S rRNA gene, *Paenibacillus koreensis* YC300.

BWM-PP-07

Isolation of Lignin-Degrading Bacteria from Coir Pith: A Promising Approach for Bioremediation

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Lignin, a complex organic polymer abundant in plant cell walls, poses a significant challenge for biodegradation due to its recalcitrant nature. However, certain microorganisms possess the enzymatic machinery to efficiently degrade lignin, offering potential applications in bioremediation and biofuel production. In this study, we focused on isolating lignin-degrading bacteria from coir pith, a lignocellulosic waste product generated from coconut processing. Coir pith represents a rich source of lignin and cellulose, making it an ideal substrate for the isolation of lignin-degrading microorganisms. Samples of coir pith were collected from local processing units and subjected to selective enrichment techniques on lignin-supplemented media known Kraft lignin. Following isolation and purification steps, bacterial colonies exhibiting lignin-degrading activity were characterized using biochemical tests and molecular techniques. The isolated bacteria were identified at the species level by 16srRNA sequencing, and their lignin-degrading capabilities were confirmed through biochemical assays. Our results demonstrate successful isolation of lignin-degrading bacteria from coir pith as *Pusillimonas noertimannii,* highlighting the potential of this microorganisms for bioremediation applications. Further research is warranted to elucidate the laccase, lignin peroxidase and manganese peroxidase enzymes involved in lignin degradation it will be tested at various concentrations and will be optimized to see the efficiency of these bacteria for industrial-scale processes. This study contributes to the expanding knowledge of lignin biodegradation and underscores the importance of exploring diverse environmental sources for the isolation of lignin-degrading microorganisms.

Keywords: Coirpith, lignin, Bioremediation, *Pusillimonas neortemannii,* lignolysis.

BWM-PP-08

Study on the Spatial pattern of distribution of insects in Hymenopteran apocrites in endosulfan affected areas of Kasaragod district in Kerala.

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Endosulfan is one of the synthetic pesticides comes under organochlorines caused severe environmental problems in past. During 1970s onwards it had been intensively used globally as a pesticide to control variety of pests. Along with these, useful insects are also destroyed. Due to excessive use and hazardous effect of endosulfan in environment, the Kerala Government banned the use of endosulfan in 2005. The main aim of my study was to find out the distributional impact of the particular sub order from hymenoptera, apocrita, includes bees, wasps and ants, after the ban of endosulfan and re-emergence of these insects in selected areas of Kasaragod. Monthly data were collected from selected, areas, surveyed, analysed and calculated by SPSS ONE WAY ANOVA. The result shows that rapid increase in the number of hymenopterans in particular season. This indicates that the survival capacity of the species is increased due to the presence of sufficient food materials and variations that made strongest competitor among themselves due to the impact of pesticide application.

Key Words: Endosulfan, ONE WAY ANOVA, Hymenoptera, Apocrita, Re-emergence.

BWM-PP-09

Isolation and Screening of Keratinolytic Bacteria from Poultry Feather Dumped Soil

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Human civilization, with its numerous activities, results in the accumulation of huge amounts of solid wastes in the environment. With the expansion of human population, disposal and management of solid waste is becoming one of the major alarms faced by humanity.

Even though various methods of disposal such as burying, incineration or disposing it in the specified locations have been devised to reduce the quantity of keratin waste generated annually, a significant amount of it is still created globally. Feathers, hair, horns, nails and hooves are examples of keratin wastes that are mostly produced from animal body parts and as waste from industrial processes, primarily from butcher shops, chicken farms and leather industry. These wastes accumulate in the ecosystem and are regarded as pollutants which increases the likelihood of environmental danger. For instance, an estimated 40 million tonnes of these waste feathers are burnt annually spewing out sulphur dioxide and carbon dioxide in the process.

Under mild circumstances, keratin proteins are difficult to solubilize because they are biochemically inert biomaterials. This is because keratin components have a high number of disulphide bonds between cysteine amino acids. Consequently, it is challenging for typical proteolytic enzymes (trypsin, pepsin) which are primarily derived from plant sources to fully break down keratin into smaller components. Most reports suggest that bacteria and their enzymes are responsible for the whole breakdown of keratin wastes. Biodegradation of keratin wastes by keratinophilic microorganisms, and their enzymes (keratinases) overcomes the drawback observed by chemical and thermal treatment. The aim of this study was to isolate and screen keratinolytic bacteria from soil where poultry wastes are dumped, with the potential for applications in bioremediation.Soil samples were collected from areas surrounding poultry farms where feather waste was excessively discarded. The samples were processed and inoculated onto selective media (Feather meal agar) containing keratin as the sole carbon source. Isolated bacterial colonies exhibiting growth and clear zones of feather degradation were selected. A total of 13 bacterial isolates were taken forward for further studies. These isolates were capable of degradation of feathers in 20 days of incubation.

Morphological and biochemical characterization was carried out for the selected isolates. Morphological characterization included Gram staining and biochemical tests of the isolates led to their identification as Bacillus spp, Buttiauxella spp, Shigella spp, Proteus spp, Kluyvera spp, Alcaligenes spp, Pseudomonas spp and Ochrobactrum spp.Thus, these novel keratinolytic bacterial isolates have potential use in processes involving keratin hydrolysis.

Keywords: Keratinolytic bacteria, Skimmed milk agar, Feather meal agar, Bioremediation

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CHAP-OP-01

Electrical Conductivity Studies of Alkali Iron Borate Glasses

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Borate glasses are of particular interest due to their properties including low melting, chemical inertness, optical transparency and flexibility in terms of glass formability. In general, doping of vitreous B_2O_3 by alkali oxide improves the mechanical stability and reduces hygroscopic nature of the glasses. Further, borate glasses with alkali metals like Li, Na are known to be potential candidates in energy storage applications like solid state electrolytes in batteries because of their excellent ionic conductivity. Only a limited work is reported in this area, so far. In this background we have synthesized and investigated the electrical conductivity properties of alkali borate glasses doped with Iron oxide (Transition Metal Oxide). The results are presented here; Physical and electrical properties of alkali iron borate glasses of composition xFe_2O-$(60-x)M_2O$-$40B_2O_3$ (M=Na, Li) with x=0, 5, 10, 15mol% are studied. All the glasses were prepared by melt-quenching method. X-ray diffraction results confirm the non-crystalline nature of the prepared samples. Effect of doping with iron oxide can be clearly seen in the the density and molar volume values with composition. Density increases and molar volume decreases with increasing iron concentration. The electrical conductivity measurements were done in the frequency range 100Hz to 5MHz at room temperature. AC conductivity of all the glasses shows increasing trend with increasing frequency. At low frequencies (<1kHz), the highest electrical conductivity was observed for sodium iron borate glass with 10mol% Fe and for lithium iron borate glass with 15mol% Fe.

Keywords: Borate glasses, Melt-quenching, Electrical conductivity, Iron doping, Dielectric studies

CHAP-OP-02

Electrochemical Sensor Detection Studies of Tartaric Acid And Grape Juice Using rGO Decorated Ceo_2 Nanoparticles

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The study deals with the synthesis and characterization of rGO decorated CeO_2 through simple reflux method. The prepared nanocomposite underwent characterization techniques by using X-ray diffraction (XRD), Fourier emission scanning electron microscopy (FE-SEM), Energy Dispersive X-ray analysis (EDS), Ultra Violet-visible spectroscopy (UV), Brunauer-Emmett-Teller (BET) and X-ray photoelectron spectroscopy (XPS). The nickel mesh electrode was used for the electrochemical sensing performance for tartaric acid and grape juice using Cyclic voltammetry (CV) and Differential pulse voltammetry (DPV) in 0.5 M KOH in the various concentration range. The selectivity and sensitivity of the sensor material was analyzed and the detection limits of both sensors were determined to be 13.12 μM and 32.67 μM for grape juice and tartaric acid respectively.

Keywords: rGO/CeO_2; Reflux method; CV; DPV; Tartaric acid; Grape juice.

CHAP-OP-03

Enhanced Bifunctional Electrocatalysis For Water Splitting: Synthesis And Characterization Of Cu-BTC/S-rGO Composite For Efficient HER And OER

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The multiscale structural engineering of high-performance bifunctional electrocatalysts has significant effects on the hydrogen evolution reaction (HER) and the oxygen evolution reaction (OER), affecting the overall efficiency of water-splitting processes. We developed a transition-metal-based 3D metal-organic framework (MOF) using Cu-1,3,5 benzene dicarboxylic acid material and a composite architecture with sulfur-doped reduced graphene oxide (S-rGO) using a two-step hydrothermal procedure. The synthesis technique of S-rGO is a one-step hydrothermal procedure that develops sheets with improved conductivity. This method uses graphene oxide (GO) sheets and sodium sulfide (Na_2S) as precursors, which are then exposed to a hydrothermal reaction in a single pot at 200 °C. The addition of Na_2S serves a dual purpose, acting as a sulfur dopant and a very effective reducing agent, considerably increasing the electrical conductivity of the resultant S-rGO sheets. The synthesized product was confirmed by physical characterizations such as XRD and Raman spectroscopy. Furthermore, its morphological characteristics were examined using FESEM, and its elemental composition was probed using EDAX. Furthermore, the intrinsic electrocatalytic characteristics of the MOF materials towards HER and OER were studied using LSV analysis in an alkaline media of 1.0M KOH solution. The Cu-BTC/20-SrGO electrocatalyst is superior to other optimized Cu-BTC/10-SrGO and Cu-BTC/30-SrGO nanocomposites, achieving a low overpotential of 124.2 mV for HER and 370 mV for OER at a current density of 10 mA cm^{-2} in 1.0 M KOH solution. The Tafel slope for HER and OER is 201 $mVdec^{-1}$ and 38 mV dec^{-1} respectively. The Cu-BTC/20-SrGO electrode required 1.72 V to generate 10 mA cm^{-2} in a two-electrode (Cu-BTC/20-SrGO // Cu-BTC/20-SrGO) electrolysis setup and remained stable for 24 hours. This work identifies a nonprecious path for creating robust and efficient bifunctional electrocatalysts for HER and OER.

Keywords: Metal-organic framework, Water splitting, hydrothermal synthesis, Na_2S dopant, electrocatalyst

CHAP-OP-04

Investigations on the role of Hole-Injection Material Thickness on the Performance of Organic Light Emitting Diodes

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In this study, we explored the impact of thickness (0-8 nm) of the hole-injection layer, 2,3,5,6-Tetrafluoro-tetracyanoquinodimethane (F_4TCNQ), on the performance of thermally evaporated multilayer organic light-emitting diodes (OLEDs) utilizing tris(8-hydroxy-quinolinato)aluminium (Alq_3) as the electroluminescent material. Notably, a device featuring an 8nm thick F_4TCNQ layer exhibited a high current density, approximately 100 times higher than a device without an F_4TCNQ layer. The current density increased as the thickness (0-8 nm) of the F_4TCNQ layer increased for a given applied voltage. In contrast to the trend observed in current density, luminance increased as the F_4TCNQ thickness to 6nm, beyond which a decrease in luminance was observed. Correspondingly, the device efficiency demonstrated enhancement with increasing F_4TCNQ layer thickness up to 6nm, beyond which a decline in efficiency was observed. Specifically, the current efficiency of the device with a 6nm F_4TCNQ layer was found to be four times greater than that of the device without an F_4TCNQ layer. These findings suggest that a thin F_4TCNQ layer (6nm) is essential for effectively injecting holes in OLEDs.

Keywords: Hole-injection layer; OLEDs; F_4TCNQ; Efficiency; Charge injection

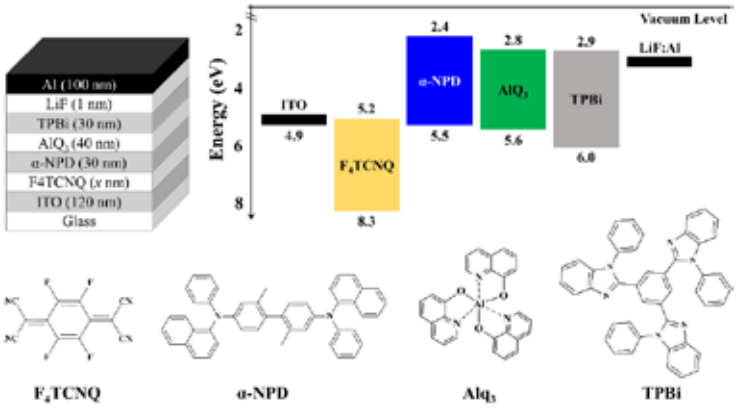

Figure. Configurations of OLEDs with different thicknesses of the F_4TCNQ modification layer, where x is 0-8 nm for **devices D_0–D_8**. Energy diagram of OLEDs with the F_4TCNQ modification layer is also exhibited.

CHAP-OP-05

Structural and Optical Studies in Alkaline Earth Borate Glasses

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Borate glasses are studied extensively for their ease of synthesis, optical transparency and chemical stability. Alkaline earth oxides have shown to be good modifiers to borate glasses by increasing their mechanical strength, increasing the number of oxidation sites for dopants and decreasing the hygroscopicity of borate glasses. Thus, alkaline earth borate glasses have been used as host matrices for rare earth and transition metal ion dopants to study their optical applications. A very limited number of studies have been reported in the area of doped binary alkaline earth borate glasses. With this background, we have synthesized and studied the structural and optical properties of alkaline earth borate glasses doped with Nd^{3+} and Mn^{2+} ions respectively. Calcium borate glasses of compositions 30Ca-(70-x)B_2O_3-xRO (x = 0, 0.1, 0.25, 0.5, 1.0 mol % and RO = Nd_2O_3, MnO_2) are synthesized using melt-quench technique. The density measurements reveal that the density and molar volume of the glass samples increase with increase in the dopant concentrations. The structural properties are investigated through Raman spectroscopy. The optical properties of Nd^{3+} doped glasses are studied through UV-Vis spectroscopy. Optical parameters like the bandgap energy (E_g), Urbach's energy (E_U) and J-O parameters (Ω_2, Ω_4, Ω_6) are determined and the results are discussed.

Key words: Alkaline earth borate glasses, Raman, UV-Vis spectroscopy, J-O parameters

CHEM-OP-01

A Novel, Sustainable Strategy For The Fabrication Of $Zn_3(OH)_2V_2O_7$ $2H_2O$/ Betalains Nanocomposite For Green Energy Storage Devices

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The development of high-performance wearable energy storage technologies heavily depends on the structural design of electroactive materials, offering the numerous benefits of high capacity and elevated durability. Hydrated metal vanadates are potential layered anode materials for Li-ion batteries (LIBs) because they possess a large capacity, are inexpensive, and have a wealth of resources. This paper methodically outlines the synthesis of novel $Zn_3(OH)_2V_2O_7$ $2H_2O$/Betalains nanocomposite (NCs) using the water-soluble betalain extract-assisted low temperature hydrothermal method and the improved characteristics of the composite with the betalains for morphology, electrical, optical, electrochemical, and advanced performance-enhancing electrochemical properties to boost the Li^+ storage processes. The Synthesized NCs were structurally, vibrationally, morphologically, elementally, and optically confirmed by several analytical methods, such as XRD, FT-IR, SEM, EDAX, UV-DRS, PL and PEIS. With low impedance, ZVBn shows high electrochemical activity. With a high potential window of 2.4 V, the constructed ZVBn-based supercapacitor system exhibited stable cyclic voltammograms even at high scan rates (10,000 mVs^{-1}). The highest Energy density of 44.4 $Whkg^{-1}$, whereas the highest power density was obtained to be 1.1149 W/g. ZVBn NCs serve as an anode material for energy storage in the form of LIBs, with an initial discharge capacity of 1200 $mAhg^{-1}$. The specific discharge capacity was found to be 742 $mAhg^{-1}$, even after 100 cycles at a 0.1 C rate. Additionally, their stability and high coulombic efficiency indicate their potential for long-term and reliable energy storage applications.

Keywords: ZVBn; Betalain; Hydrothermal; Supercapacitors; Li-ion battery.

CHEM-OP-02

A Ratiometric Fluorescent H_2O Sensor For The Selective Turn-On Fluorescence Detection Of Cu^{2+} By Modulating The Binding Interaction Of Cu (Ii) Complex With BSA And DNA With Docking Studies

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A fluorescence ligand pyridine coupled bis-anthracene (PBA) has been developed for selective fluorescence turn on detection of Cu^{2+}. Herein, ligand PBA also showed red shifted ratiometric fluorescence response at 507 nm in presence of water on comparison with other organic solvents, which exhibit emission within the range at 418 nm - 450 nm. Thus, we have the opportunity to use a ratiometric water sensor as a selective fluorescence turn on sensor for Cu^{2+} with a fluorescence enhancement and quantum yield by 10-fold at 446 nm with a detection limit at 1.01μM and binding constant 4×10^2 M^{-1}. For the practical application, sensor PBA can be utilized for the detection of Cu^{2+} in various types of soil like clay Soil, field Soil and sand. For the biological applications, the interaction of PBA-Cu (II) complex with the transport protein bovine serum albumin (BSA) and ct DNA has been investigated through fluorescence titration experiments. The interaction PBA-Cu(II) complex with BSA and ct-DNA has been analyzed using by theoretical docking studies.

Keywords: Fluorescence Sensing, Water sensor, Cu Sensor, DNA Binding, Docking Studies

CHEM-OP-03

Curcumin Based Schiff Base As Corrosion Inhibitor For Steel Material: Adsorption And Interfacial Electrochemistry

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A curcumin-based Schiff base p-Amino[(curcumin)]-phenol (PAC) has been synthesised and studied for its corrosion inhibition performance on mild steel (MS) in 1 M HCl. Obeying Langmuir adsorption isotherm, these molecules inhibit corrosion with mixed type of mechanism. Inhibition property of studied molecule increases with increasing its concentration and decreases with rising temperature. To determine the relationship between the inhibition property and the molecular structure of PAC, a few thermodynamic parameters were computed. Gravimetric and electrochemical experiments performed to study the inhibition efficiency of PAC prove its excellence to protect MS materials in aggressive corrosive environment. In addition, quantum chemical studies were carried out to obtain deeper insight into the corrosion protection mechanism.

Keywords: Mild steel, Corrosion inhibition, Adsorption, Potentiodynamic polarization, p-Amino[(curcumin)]-phenol, Electrochemical impedance spectroscopy.

CHEM-OP-04

Development Of Colorimetric Chemosensor For The Detection Of Multi-Anions In Organo-Aqueous Media

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The present study focuses on synthesis of colorimetric chemosensor for detection of environmentally toxic anions. A schiff based colorimetric chemosensor (R) with IUPAC chemicalname 4,4'-(((1E,1'E)-thieno[3,2-b]thiophene-2,5-diylbis(methanylylidene))bis(hydrazin-1-yl-2-ylidene))dibenzonitrile was synthesized and characterized using FT-IR, ^{1}H NMR, ^{13}C NMR and LC-MS. The chemosensor R was analysed for its activity towards various anions in aqueous solutions which showed selectivity for arsenate, arsenite and phosphate with a colour change from yellow to purple in the receptor solution prepared with 100% DMSO. On preparing the receptor solution with aqueous solvent mixture (20% aq. DMSO) the colour of the receptor–anion complex got lessened in intensity and selectivity was achieved for phosphate ions over other studied anions. The study was supported by the UV-Vis Titrations. The binding constant for phosphate and receptor solution with 80% DMSO was calculated using BH plots. Least detection limit was found to be in ppm levels. Interference of other anions were also studied using UV Vis spectroscopy. Further the binding mechanism was confirmed by cyclic voltammetry and Density Functional Theory (DFT) Studies.

Keywords: Chemosensor, UV-Vis titration, DFT, ion detection

CHEM-OP-05

Extraction And Characterization Of SiO_2 From Rice Husk For Electrochemical Sensor Detection Of Bee Pollen And Cow Urine

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This study reports on the synthesis and characterization of silicon dioxide nanoparticles (SiO_2 NPs) produced through acid leaching of raw rice husk and electrochemical sensor studies. The rice husk was subjected to acid treatment using Ascorbic acid, followed by calcination to produce SiO_2 NPs. The synthesized NPs were characterized using various techniques such as X-ray diffraction (XRD), Scanning Electron Microscopy (SEM), Fourier Transform Infrared rays (FTIR) and Energy Dispersive X-ray Analysis (EDAX). The results showed that the obtained SiO_2 NPs had a high purity, uniform size distribution, and a crystalline structure. The average particle size of the SiO_2 NPs was found to be around 60.82 nm. The electrochemical sensor studies were analyzed using Cyclic Voltammetry (CV) and Differential Pulse Voltammetry (DPV) techniques by sensing Bee pollen and cow urine in the 1 M KCl solution, by showing low LOD and LOQ values in the sensing performance, sensitivity and selectivity of the sensor are also analyzed in the study. This method provides a simple, low-cost, and environmentally friendly way of producing SiO_2 NPs, which could have potential applications in various fields such as Sensing, Energy storage, catalysis, biomedical, and electronics.

Keywords: SiO_2; Characterization; Acid leaching; Chemical sensor.

CHEM-OP-06

Facile Synthesis Of Porous $NiCO_2S_4$ As Electrode Material For High Performance Super Capacitor Applications

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It is imperative to develop a new class of electrode materials with high electrochemical performance and stability in order to push the supercapacitor's energy density limit. Among many materials explored in the last decade sulphide based active materials have gained greater importance in the field of energy storage devices. In particular, binary metal sulphides due to its higher capacity and electrochemical performance are considered highly potential electrode materials for energy storage devices. In this context, $NiCo_2S_4$ exhibits greater redox ability and electrical conductivity than the mono sulphide. However, the common problem with the bimetallic sulphides is difficulty in the synthesis of phase pure product. In the present work, phase pure crystalline $NiCo_2S_4$ is synthesized by one step hydrothermal technique. The product is characterized by various analytical and spectroscopic techniques such as PXRD, SEM, TEM, XPS. Electron microscopic images shows the porous nature of the product and nano size of the $NiCo_2S_4$. Electrochemical performance shows that the prepared $NiCo_2S_4$ exhibited a high capacitance of ~ 2000 F g^{-1} at 1 A g^{-1}, capacity retention of 85% at 20 A g^{-1} after 10000 charge/discharge cycles. These results shows that our $NiCo_2S_4$ nanostructures are promising electrode materials for high-performance supercapacitor applications.

Keywords: Super capacitors, Hydrothermal synthesis, Bimetallic Sulphides, Energy storage Devices

CHEM-OP-07

Viscosity-sensitive and AIE-active Bimodal Fluorescent Probe for The Selective Detection of OCl^- and Cu^{2+}

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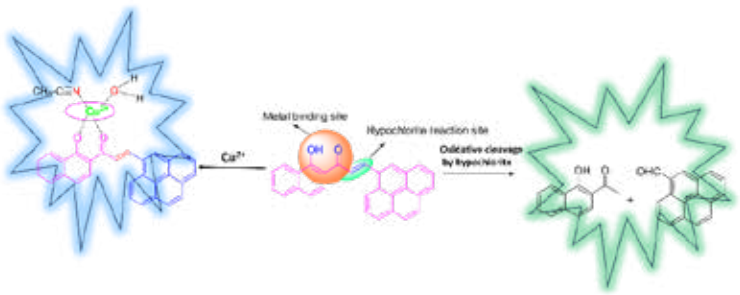

A novel dual-mode viscosity-sensitive and AIE-active fluorescent chemosensor based on the naphthalene coupled pyrene (NCP) moiety was designed and synthesized for the selective detection of OCl^- and Cu^{2+}. In non-viscous media, NCP exhibited weak fluorescence; however, with an increase in viscosity using various proportions of glycerol, the fluorescence intensity was enhanced to 461 nm with a 6-fold increase in fluorescence quantum yields, which could be utilized for the quantitative determination of viscosity. Interestingly, NCP exhibited novel AIE characteristics in terms of size and growth in H_2O–CH_3CN mixtures with high water contents and different volume percentage of water, which was investigated using fluorescence, DLS study and SEM analysis. Interestingly, this probe can also be effectively employed as a dual-mode fluorescent probe for light up fluorescent detection of OCl^- and Cu^{2+} at different emission wavelengths of 439 nm and 457 nm via chemodosimetric and chelation pathways, respectively. The fast-sensing ability of NCP towards OCl^- was shown by a low detection limit of 0.546 mM and the binding affinity of NCP with Cu^{2+} was proved by a low detection limit of 3.97 mM and a high binding constant of 1.66×10^3 M^{-1}. The sensing mechanism of NCP towards OCl^- and Cu^{2+} was verified by UV-vis spectroscopy, fluorescence analysis, ^{1}H-NMR analysis, mass spectroscopy, DFT study and Job plot analysis.

Keywords: Chemosensor, Synthesis, Fluorescence, Analytes, Coordination, Fluorophore

CHEM-OP-08

Effect Of Aliphatic And Aromatic Aldehydes On Morphology, Orientation, And Corrosion Resistant Property Of The Bright Zinc Electrodeposition

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The aldehydes such as aliphatic; Isobutraldehyde (IBA), aromatic single benzene ring; Benzaldehyde (BA), fused two benzene rings; 1-Naphthaldehyde (NA) and two non-fused benzene rings; 3-phenoxybenzaldehyde (PBA) have been used as brightener for zinc electrodeposition in combination with cetyltrimethylammonium bromide (CTAB). The influence of structure of these aldehydes on surface morphology and orientation of bright zinc coating has been systematically investigated by scanning electron microscope (SEM), atomic force microscope (AFM) and X-ray diffraction (XRD) analysis. The presence of aldehyde generates bright, nanocrystalline, smooth zinc deposit with (100) preferred orientation. The anticorrosion property of coatings has been analyzed by weight loss measurement, Tafel extrapolation method and electrochemical impedance studies. The structure of the aldehydes influences on formation of relative texture coefficient value of (100) plane, surface roughness and corrosion resistance property of coating. The BA+CTAB mixture gave satisfactory mirror bright zinc coating with excellent corrosion resistance.

Keywords: Electrodeposition; Aldehydes; Morphology; Orientation; Corrosion resistance; Bright zinc coating.

CHEM-PP-01

Corrosion Inhibition Studies Of Aluminum Alloy By Using *Aloes* Extract In 1.0 M Hydrochloric Acid Solution Medium

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The corrosion inhibition of Aluminum Alloy in 1.0 M HCl by the *Aloes* leaves extract has been studied using weight loss methods, potentiodynamic polarization and electrochemical impedance spectroscopy techniques. The results show that the inhibition efficiency increases with the increase of the extract concentration. The effect of temperature on the corrosion behavior of Aluminum Alloy in 1M HCl with addition of the extract was also studied. The adsorption of the extract molecules on the Alloy surface obeys Langmuir adsorption isotherm and occurs spontaneously. The activation energy as well as other thermodynamic parameters for the inhibition process was calculated. These thermodynamic parameters show strong interaction between inhibitor and Aluminum Alloy surface.

CHEM-PP-02

Unveiling the Potential of Pd_2Sn Catalyst for Enhanced Oxidation Reaction (EOR) in Fuel cells

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Fuel cells have emerged as one of the most prominent options for a renewable energy conversion device. Development of highly active, low cost catalyst is crucial for the commercialisation of fuel cells. Here we are reporting a highly active Pd_2Sn intemetallic nanoparticles synthesised by one pot solvothermal method. The characterization of synthesized catalyst is done by X-ray diffraction [XRD], Inductively coupled plasma optical emission spectra [ICP-OES] and X-ray photoelectron spectroscopy [XPS]. The catalytic activity towards electrochemical ethanol oxidation reaction [EOR] was studied by using Linear Sweep Voltammetry [LSV], Cyclic Voltammetry [CV], Chronoamprometry [CA] methods, and compared to commercially available 20% Pd/C catalyst. It is observed that the synthesized Pd_2Sn are more active and stable for ethanol oxidation reaction due to synergetic effect between Pd and Sn.

CHEG-OP-01

Detecting Fe^{3+} Ions Using Green Synthesis Of Carbon Dots (C-Dots) Derived From *Hibiscus Rosa-Sinensis*.

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Carbon dots (C-dots), a type of carbon nanomaterials with dimensions smaller than 10 nm, exhibit unique optical and electrical properties that have diverse applications in sensors, photocatalysis, biomedicine, and optoelectronics. In this study, nanocarbon dots are synthesized from *Hibiscus rosa-sinensis* flowers using a single-step hydrothermal method. Advanced characterization techniques, such as UV-visible absorption spectroscopy, Fourier transform infrared (FTIR) spectroscopy, and high-resolution transmission electron microscopy (HR-TEM), are employed to verify the structure of the carbon nanoparticles. Photoluminescence (PL) spectroscopy confirms the dependence of the PL emission of carbon dots on different excitation wavelengths. The interaction between various metal ions and the luminescence of C-dots, particularly Fe^{3+} ions, is investigated. The Stern-Volmer equation is utilized to analyze the quenching process involved in the sensing mechanism of carbon dots. Our findings demonstrate linearity across a concentration range of 10-100 μM, with successful detection of limit concentrations as low as 0.514 nM. The presence of surface functional groups capable of complexation with Fe^{3+} ions is identified as the main factor driving the sensing capability. The efficient complexation between the metal ions and oxygen-containing functional groups present in luminescent carbon dots forms the basis for carbon dot-based sensors. The selective sensing of Fe^{3+} ions by C-dots holds promise for biochemical investigations related to iron metabolism and anaemia diagnosis. This research highlights the potential for designing environmentally friendly sensor systems for detecting metal ions in biomedical and environmental applications.

CHEG-OP-02

Development of persistency index using chemical reactivity parameters for halogenated organic pollutants

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The growing diversity of industrial and pharmaceutical chemicals and their numerous congeners raises significant concerns regarding their persistent bio-accumulative and toxicity (PBT) properties. Environmental pollutants can be categorized into two groups based on their persistent, bioaccumulation and toxic nature that are (1) Legacy POPs: This category mainly consists of PCBs (polychlorinated biphenyls), PCDDs (polychlorodibenzodioxins/furans), and some organochlorine pesticides and, (2) Emerging POPs: this includes PBDEs (polybrominated diphenyl ethers), PCNs (polychlorinated naphthalenes), PFASs (perfluorooctane sulfonic acid) and short-chain chlorinated paraffin. Therefore, we have evaluated the PBT parameters of six hundred nineteen environmental chemicals and their association with ADME parameters. Further, we have performed the ranking of all these chemicals to categorized them in a class of persistent organic pollutants. This study aims to probe the suitability of the DFT-based chemical reactivity parameters and their association with the persistent nature of chemicals. Here we have found aromaticity as a possible long-range transport (LRT) potential descriptor that could play a significant role in identifying the persistent nature of chemicals.

Keywords: organic pollutants, long-range transport (LRT),PCBs (polychlorinated biphenyls), Environmental pollutants

CHEG-OP-03

Green Synthesized Zinc Oxide Nanoparticles Mediated Poly (Tartaric Acid Co-Diethylene Glycol-Co-Acrylic Acid) Polymer Nanocomposite Synthesis With Application

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The zinc oxide nanoparticles were synthesized using *Brassaia actinophylla* (*B. actinophylla*) flower extract by solution combustion method. The poly(tartaric acid co-diethylene glycol-co-acrylic acid (TDA) hydrogel was prepared using tartaric acid(T),diethylene glycol(D) and acrylic acid (A). The synthesized ZnO nanoparticles were introduced into TDA hydrogel and the polymer nanocomposite TDA-ZnO was obtained. The UV-peak was observed at 280nm for TDA-ZnO nanocomposite. The Fourier Transform Infrared (FT-IR) peak obtained at 680 cm^{-1} and 432cm^{-1} confirmed the presence of nanoparticles in the hydrogel. The nanoparticles size was confirmed by transmission electron Microscope (TEM) and the morphology was examined by Scanning electron microscopy (SEM) analysis. The thermal stability of TDA-ZnO hydrogel was confirmed by thermo gravimetric analysis(TGA).The antibacterial activity was performed against two gram positive *Staphylococcus aureus (S. aureus*) and *Bacillus subtilis(B.subtilis)* and two gram negative *Escherichia coli*(*E.coli*), *Klebsiella pneumonia*(*K.pneumoniae)* bacterial strains at various concentrations 25, 50, 75 and 100 µL by agar well diffusion method.

Keywords: Nanoparticles, hydrogel, polymer composite, antibacterial activity

CHEG-OP-04

Green-Assisted Development And Spectroscopic Characterization Of Cobalt Ferrite Using Solution Combustion Method

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In the present work, $CoFe_2O_4$ nanoparticles are prepared through simple solution combustion method using neem leaves as fuel. The prepared material was characterized to know the size, morphology, functional groups attached, band gap and chemical constituents using X-ray Diffraction (XRD), High resolution Transmission electron microscopy(HRTEM), Fourier transform infrared spectroscopy (FTIR), Ultraviolet visible spectroscopy (UV) and Energy Dispersive X-ray (EDS) techniques. The $CoFe_2O_4$ has been structurally and morphologically investigated was found to average particle size about 25.67 nm, particles are with spherical in shape with tight cluster together in TEM images, sample are having high presence of Cobalt, Iron and Oxygen, with no impurities. The SAED pattern further confirms the presence of material through hkl planes and EDX color mapping was supporting with the material confirmation. The prepared material can be used in the field of sensor, energy storage, photocatalysis, antioxidant, and further studies.

Keywords: Green synthesis; Characterization, $CoFe_2O_4$, Solution combustion.

CHEG-PP-01

Fabrication And Characterisation of Starch- Crosslinked- Gum Acacia For Removal Of Methylene Blue Dye

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Adsorption-based colour removal from wastewater has received a lot of attention in water pollution treatment. This study involves the fabrication and preparation of biopolymeric network particles called hydrogels, which have the ability to swell and hold a significant amount of water. As an alternative to synthetic polymer-based hydrogels, natural or edible hydrogels, such as those made of proteins and polysaccharides, can swell to form three-dimensional structures with water. First, a non-toxic hydrogel composite made of starch that had been bonded with gum acacia was formed. Our super-adsorbent hydrogel's high swelling ratio and great water permeability enable massive visibility of the internal adsorbates to methylene blue dye (MB). Where adsorption batch experiments were used to evaluate how the cationic dye methylene blue was absorbed. This study demonstrates that calcium chloride alone can produce an SGA hydrogel with a well-cross-linked structure, and it also shows that the calcium chloride-based super-adsorbent hydrogel has a promising use in the elimination of organic dyes. XRD [X-ray diffraction], TGA [thermogravimetric analysis], FESEM [Field Emission Scanning Electron Microscopy], BET [Brunauer-Emmett-Teller], FTIR [fourier transform infrared], and XPS [X-ray photoelectron spectroscopy] investigations were used to further characterise the starch and gum acacia composites

Keywords: Hydrogel, starch, gum acacia, antimicrobial, adsorption.

CHEG-PP-02

Review On The Removal Of Methylene Blue Using Adsorption Process With Low-Cost Adsorbents

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The primary and most obvious parameter indicating water quality is the color of the water. Not only can it be aesthetically disturbing, but it can also be an indicator of contamination. Clean, high-quality water is a valuable and essential asset in a healthy society. In this article, the effort to remove methylene blue (MB) from waste water using the adsorption process and the use of low-cost adsorbents has been reviewed instead of commercial activated carbon, its widespread use is restricted due to its relatively high cost, which led to research on alternative non-conventional and low-cost adsorbents. The removal of MB, as a pollutant, from waste waters of textile, paper, printing and other industries has been addressed by the researchers. The adsorption process is influenced by several parameters, which are the basis of all laboratories researching the optimum conditions. The main objective of this review is to provide up-to-date information on the most studied influencing factors. The effects of initial dye concentration, pH, adsorbent dosage, particle size and temperature are illustrated through examples from the last five years (2020–2024) of research. Moreover, general trends are drawn based on these findings. The purpose of this review article is to organize the scattered available information on various aspects of a wide range of potentially low-cost adsorbents for MB removal. These include agricultural wastes, industrial solid wastes, biomass, clays, minerals and zeolites. Our conclusions are based on previously published literature.

Keywords: Dye, Methylene Blue, Textile, Adsorbents, Pollutant.

CHEG-PP-03

Green Synthesis of Iron Oxide Nanoparticles from The Extracts Of *Hibiscus Rosa-Sinensis*

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Nanoparticles (NP) have drawn much attention due to their distinctive and fascinating properties that find numerous applications. Traditional chemical synthesis of nanomaterials is now being reviewed, to make the process much more sustainable and environment friendly. Green synthesis of nanomaterials using plant based materials is gaining popularity due to its advantages and ease of fabrication. In this work, we explore the synthesis of iron oxide nanoparticles with uniform shape and size, from the leaf and flowers of *Hibiscus rosa-sinensis* (commonly known as Chinese hibiscus). Previously, iron oxide (IO) NPs, having dimensions ranging from 1-100 nm with different oxidation states were reported. The IO NPs commonly reported were in either hematite (α/γ-Fe_2O_3) or magnetite (Fe_3O_4) forms, with the prior one being more stable at atmospheric conditions. Aqueous extracts of hibiscus leaf and flower were prepared separately. Ferric chloride hexahydrate ($FeCl_3.6H_2O$) precursor was added to each of the extracts in the ratios of 1:1 and 1:2. The solution was heated using a microwave for 20 seconds. Formation of brown precipitate indicated formation of NPs. The solution was then washed and centrifuged to collect NPs. Preliminary characterization of NPs using UV-VIS spectroscopy indicated presence of IO NPs by producing a distinctive peak at ~270 nm. Depending on the phytochemicals present in the aqueous extract, the absorption peak can fluctuate between 230290nm for IO NPs. Further characterization studies employing FTIR, SEM and XRD are underway to identify the shape, dimensions, and the form of IO NPs produced using this method. The synthesised NPs are tentatively to be used for biomedical applications.

Keywords: Green synthesis, sustainable nanoparticles, iron oxide, nanoparticles, hibiscus flower, hibiscus leaf.

CHEG-PP-04

Green Synthesis Of Iron Oxide Nanoparticles From The Extracts Of *Azadirachta Indica*

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Nanomaterials find important applications in modern science due to their versatile properties. Nanoparticles (NPs) can be synthesized using physical, chemical and biological means. Currently, synthesis of nanoparticles using plant based extracts is gaining popularity due to the diand better control over the process. The phytochemicals found in plant extracts enable the precursor substrate to undergo redox reactions to finally produce nanoparticles of various shapes, sizes and forms. The rate of NP synthesis and the quality of NPs produced depends on the phytochemicals present in the plant extract. In this study, we explore an opportunity to produce iron oxide (IO) nanoparticles using aqueous extract of the *Azadirachta indica* (commonly known as neem) leaves. Aqueous extract of *Azadirachta indica* is previously reported to contain high amounts of saponin, steroids and terpenoids. These phytochemicals enable production of IO NPs from ferric chloride hexahydrate ($FeCl_3.6H_2O$) precursor solution. The aqueous extract of plant leaf is mixed with precursor solution in the ratios of 1:1, 1:2 and 1:3. The mixture is heated and a change in color of solution from brown to black, indicates production of IO NPs. The resulting solution is centrifuged and washed several times prior to characterization studies. The preliminary characterization studies of NPs employing UV-VIS spectroscopy, indicated presence of IO NPs by producing a distinctive absorption peak between 250-270 nm. Further characterization studies employing SEM, FTIR and XRD are underway, to identify the shape, dimensions, and the form of IO NPs produced using this method. The synthesised NPs are tentatively to be used for environmental remediation applications.

Keywords: Green synthesis, sustainable nanoparticles, iron oxide, nanoparticles, neem, *Azadirachta indica.*

CHNT-OP-01

An Experimental And Theoretical Approach For Photocatalytic Degradation Of The 4-Nitrophenol In Aqueous Suspensions Using A Novel Activated Carbon Zro_2-Zno Nanocomposite Under UV Light

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This paper describes the photocatalytic degradation of the 4-nitrophenol in aqueous suspensions using *croton caudatus* activated carbon/ZrO_2-ZnO (CCAC/ZrO_2-ZnO) nanocomposite in UV light. Analytical techniques such as XRD, FT-IR, TEM-SEAD, XPS, PL, and BET analyzer were used to characterize the CCAC/ZrO_2-ZnO nanocomposite. The BET surface area of the photocatalyst was found to be 223.387 m^2g^{-1}, having a total pore volume of 0.1845 cm^3g^{-1}. The photocatalytic degradation of 4-nitrophenol followed pseudo-first-order rate kinetics with a half-life period ($t_{1/2}$) of 7.088 mins and K_{ap} (apparent rate constant) of 0.09778 min^{-1}. The mechanism of composite formation was explained using DFT investigations, which demonstrated a favorable immobilization of ZrO_2-ZnO on CCAC. Chemical descriptors gained from DFT investigations, such as HOMO-LUMO energy, ionization energy, dipole moment, chemical softness, and chemical hardness, supported an understanding of the relative efficiency and reactivity of ZrO_2-ZnO and CCAC/ZrO_2-ZnO towards 4-nitrophenol degradation.

Keywords: CCAC/ZrO_2-ZnO Nanocomposite, Photocatalytic Degradation, UV Light Irradiation, density functional theory

CHNT-OP-02

Aranmula Mirrors: Nanostructural Marvels and Quasicrystalline Beauty In Tradition.

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Aranmula mirrors, revered for their artisanal excellence and cultural significance, have captivated generations with their unparalleled craftsmanship. This review delves into the scientific intricacies underlying the mystique of Aranmula mirrors, focusing on the role of nanoparticles and quasi-crystalline nature in shaping their unique properties. By meticulously examining historical texts, employing modern scientific techniques, and integrating cultural insights, the chemical secrets of these mirrors are unraveled. Through spectroscopic analysis and electron microscopy, it is found that the nanoparticles, predominantly comprised of copper and tin, is meticulously embedded within the mirror's alloy matrix. Furthermore, utilizing X-ray diffraction techniques, elucidation of the quasi-crystalline arrangement of atoms is achieved, conferring exceptional durability and optical clarity to these mirrors. This review bridges the realms of tradition and science, shedding light on the remarkable heritage of Aranmula mirrors while highlighting their relevance in contemporary materials research and cultural preservation efforts. Through a comprehensive exploration of their nanostructural composition and quasi-crystalline nature, this paper contributes to a deeper understanding of Aranmula mirrors, positioning them as exquisite artifacts of Indian craftsmanship and scientific fascination.

Keywords: Aranmula, Cu-Sn alloy, Quasi-crystalline phase, Dendritic Microstructure, X-Ray Diffraction.

CHNT-OP-03

Characterization Of Bio-Conjugated Silver Nanoparticles Using *Caesalpinia Crista* Seed Coats Calcination And Their Antibacterial Activities

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Caesalpinia crista seed coats are traditionally and medicinally useful for treating anthelmintic, tumor, placenta removal, antimicrobial, liver disorders, febrifugal, pain, inflammation, rheumatism, respiratory disorders, fever, bladder stone, malarial fever, swellings, asthma, and colic etc. In this investigation, seed coats from Caesalpinia crista were used to synthesize bioconjugated silver nanoparticles (AgNPs) using green method and calcination method. The effects of calcination (200 °C for 30 min) on the AgNPs' structural properties and antibacterial activity were examined. The calcinated / uncalcinated AgNPs was evaluated using the agar-well diffusion method against pathogenic bacteria, including Pseudomonas aeroginosa, Escherichia coli, Salmonella typhi, and Staphylococcus aureus. UV Visible spectra is used to confirm the reduction of Ag+ to AgNPs by the peak obtained at 430 nm for uncalcinated bioconjugated AgNps and the peak of calcinated bioconjugated AgNps is 285nm.. Scanning electron microscopy (SEM) and X-ray diffraction analysis (XRD) were used to measure the size of the uncalcinated and calcinated synthesized bioconjugated AgNPs, which were spherical crystalline and had sizes of 84.3 nm and 101.15 nm respectively. Functional groups of bioactive compounds were identified in the uncalcinated and calcinated bioconjugated AgNPs by Fourier Transform Infrared Spectroscopy (FT-IR) analysis. EDAX is used for determining the elemental composition of the AgNPs absorption peak in the range of 2.7 to 3.4keV in both uncalcinated and calcinated bioconjugated AgNps. According to in vitro antibacterial research, uncalcinated AgNPs significantly reduced the development of tested pathogenic bacteria, but the AgNPs that had been calcinated exhibited no growth inhibition activity. Probably due to calcinations that may have degraded all the phytochemicals adhered to the Ag nanoparticles

Keywords: *Caesalpinia Crista* Ag-NPs Uv SEM FT-IR XRD Calcination Antibacterial

CHNT-OP-04

Development And Structural Characterization Of $ZnFe_2O_4$ Nanoparticles Using *Murraya Rutaceae* Through Green Approach

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In the present study, we prepared Zinc ferrite through easy and feasible way through solution combustion method. The prepared material has been characterized through XRD (X-ray diffraction), SEM (Scanning electron microscopy), EDAX (Energy dispersive X-ray analysis), HR-TEM (High Resolution-Transmission Electron spectroscopy), FTIR (Fourier Transform infrared spectroscopy) and UV-Vis (Ultraviolet-Visible) spectroscopy. The particle size of the material was found to be 20.45 nm, the particle has been found with tight agglomeration, composition of the material has been analyzed with high amount of Zn, Fe, and O with no impurities were detected. The HRTEM images shows a small globular in shape with uniform distribution in the area, particle was well defined and uniform throughout the area, supported with the SAED pattern, EDX color mapping. The functional group stretching was reported with the metal oxide bond stretching in the IR spectrum. The prepared material can be useful in wastewater treatment, catalysis, sensors, energy storage devices etc.

Keywords: $ZnFe_2O_4$; Curry leaves; Synthesis; Characterization; Solution combustion.

CHNT-OP-05

Doxorubicin Loaded Thermo-Responsive Hydrogels Coated Iron Oxide Nanoparticles For Combined Chemotherapy With Magnetic Hyperthermia For Effective Treatment Of Cancer

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Systemic toxicity, development of drug resistance, and nonspecific interaction are few limitations of conventional chemotherapeutic agents that impact cancer prognosis. A rise in tumor temperature locally using magnetic nanoparticles in the presence of an oscillating electric field is termed as Magnetic Hyperthermia. The enhancement of the anti-cancer effect of chemotherapy with the application of concurrent hyperthermia has been around for more than 3 decades. However; combining magnetic hyperthermia with chemotherapeutic drugs loaded hydrogel coated nanoparticles has recently emerged as a promising tool for combinational therapeutic application against cancer. The study was focused on the synthesis of superparamagnetic iron oxide nanoparticles functionalized with thermo-responsive hydrogels for controlled hyperthermia and targeted drug delivery. Transmission electron microscopy, X-ray diffraction, and vibrating sample magnetometer were used to characterize the size, phase, and magnetization of the synthesized nanoparticles. Scanning electron microscopy, thermo-responsiveness, drug loading, and drug release of the hydrogel were analyzed. Magnetic hyperthermia in combination with drug release was determined using doxorubicin-loaded nanoparticles against MCF-7 cell lines. The *in vitro* toxicity of the magnetic nanoparticles and hydrogel coated nanoparticles was estimated using MCF-7 and HeLa cell lines. Biodistribution and toxicity profiling of the magnetic nanoparticles was studied on a swiss mice model. The synthesized nanoparticles were found to be highly crystalline with an average particle diameter of 19 nm. It exhibited a high saturation magnetization of 82 emu/g. The hydrogel coated nanoparticles demonstrated cytocompatibility up to a concentration of 100 µg/ml, incubated for a period of 48 h on MCF-7 and HeLa cell lines . The maximum doxorubicin release from the thermo-responsive hydrogel was found to be 42°C. Simultaneous exposure of magnetic hyperthermia with doxorubicin was most effective against the MCF-7 than the sequential exposure. Combinational hyperthermia with stimulus-responsive drug-loaded hydrogel serves as a promising candidate against cancer therapy.

Keywords: Magnetic Hyperthermia, Thermo-responsive hydrogels; combinational cancer therapy

CHNT-OP-06

Enhancement On The Optical Properties Of Carbon Dot Incorporated Sulphamic Acid Crystals

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The current article is the first to study the influence of carbon dots on the properties of a single sulphamic acid crystal (SA). By using a slow evaporation method, single crystals of pure and carbon dot (CO)-doped sulphamic acid (COSA) were synthesized. Powder X-ray diffraction (XRD) was used to investigate the crystalline nature of the grown crystals. The presence of several functional groups was confirmed by FTIR spectroscopy. UV–Vis–NIR absorption spectra revealed a slight reduction in the transmittance due to insertion of the dopant. The photoluminescence spectrum revealed the existence of three excitation peaks in the visible region. The doped crystal's enhansed optical characteristics and luminescence prove that they are viable for fluorescent ink applications.

Keywords: Slow evaporation method*, Doped crystals, X-ray diffraction analysis, Optical properties.*

CHNT-OP-07

Green Synthesis of Silver Nano Particles And Their Antimicrobial Activity On Waste Water

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Wastewater produced from various food and drug industries, hospitals, housing units are referring to water heavily polluted with pathogenic micro-organisms, which reflects significantly in terms of human health and also adversely affects water ecosystem. If pathogens in the waste water left untreated and survived for a long period of time it may cause infectious diseases to humans such as Skin infections, Urinary tract infections, Hemorrphagic colitis (Bloody diarrhoea), Food borne diseases. It is necessary to design a potential and effective techniques to manage the adverse effect of the wastewater to the human health. The proposed approach is preferred over conventional chemical methods due to its environmental sustainability and reduced toxicity. In the current study, the silver nanoparticles (Ag NP's) are synthesized using Lantana Camera (shrub) leaf extract as a one of the green approach methods. The extracted silver nanoparticles were further characterized using Ultra – Violet (UV-VIS) spectroscopy at visible range. The formation of silver nanoparticles (Ag NP's) were further characterized using Scanning Electron Microscopy (SEM). The synthesized nanoparticles were treated against microbes present in industrial waste water at the highest concentration (1:1) to find out the microbial activity. The results showed a significant reduction in the average number of bacterial colonies as compared to the control sample (without treatment). The present study's findings have the potential to develop a more sustainable and environmentally responsible healthcare system.

Keywords: Ag NP's, UV-VIS Spectroscopy, Microbial activity, Scanning Electron Microscopy, Nano Particle

CHNT-OP-08

Luminescence Behaviour of Hydrothermally Synthesized TiO_2 and Fe_3O_4/TiO_2 Thin Films on FTO Substrate

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This study investigates the luminescence properties of titanium dioxide TiO_2 and composite Fe_3O_4/TiO_2 thin films synthesized through a hydrothermal route. The structural, functional, optical, and luminescent characteristics of the thin films were analyzed using X-ray diffraction (XRD), Raman analysis, FTIR analysis, UV-Vis spectroscopy, and photoluminescence spectroscopy. Results demonstrate that the hydrothermal synthesis method allows precise control over thin film morphology, crystallinity, and composition, thereby influencing their luminescent behavior. Incorporating Fe_3O_4 into the TiO_2 matrix leads to notable modifications in luminescence, including enhanced emission intensity. The observed characteristics suggest potential applications in LEDs, solar cells, and photocatalytic systems. This study provides insights into the luminescence behavior of TiO_2 and Fe_3O_4/TiO_2 thin films prepared via hydrothermal synthesis, indicating their potential for advanced optoelectronic and photonic applications.

Keywords: Hydrothermal method**,** Fe_3O_4/TiO_2 thin film, Photoluminescence.

CHNT-PP-01

Structure, Microstructure, and Enhanced Sensing behavior of Pani-ZnO for Gas Sensing Applications

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Polyaniline (PANI) and metal oxides are two materials that have various applications including active sensors. Polyaniline (PANI) provides several benefits over other conductive polymers, including ease of synthesis, high conductivity, and affordability depending on the benefits of Polyaniline(PANI), here we report the PANI/ZnO(Metal Oxide) Composites as an active material for Gas sensors, Especially Nitrogen Dioxide(NO_2) by oxidative polymerizing aniline (Monomer) at room temperature Polyaniline (PANI) was Formed with ammonium per sulfate(APS) as an Oxidant. Conducting Polyaniline /Zinc Oxide (PANI/ZnO) Composites have been successfully Synthesized by the In-Situ Polymerization technique. the PANI/ZnO nanocomposites of different compositions were prepared by varying different weight percentages of ZnO nanoparticles such as 10 wt%, 20 wt %, 30 wt%, and 40 wt% into the fixed amount of the aniline monomer. The obtained final product was well characterized using an X-ray diffractometer (XRD), Scanning Electron Microscope (SEM), Fourier transform infrared spectroscopy (FTIR).XRD results show that decrease in the crystallinity of the PANI composite with an increase in dopant concentration and the presence of ZnO particles in Polyaniline. The morphology of the obtained product shows that the nanocomposite was prepared in the form of long PANI chains decorated with ZnO nanoparticles. FTIR characterization is done in KBr medium, the results reveal the formation of a polyaniline composite with Zinc Oxide. The sensitivity of PANI/ZnO Nanocomposites to NO2 has been proven. the result shows PANI/ZnO Sensitivity.

These results show that doping with ZnO is a very effective technique for altering the structural, electrical, and NO2 Gas sensing properties of PANI for different applications.

Key Words: Polyaniline(PANI), Zinc Oxide (ZnO), Nanocomposites, XRD, SEM, Sensitivity, FTIR, Gas Sensing.

CHNT-PP-02

Investigation Into The Visible Light-Assisted Photocatalytic Dye Degradation Characteristics of g-C_3N_4 Nanosheets

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g-C_3N_4 in its nanoform is a semiconductor material with a band gap of 2.3 eV that has numerous electronic and environmental uses. This study looked into the feasibility of employing graphitic carbon nitride nanosheets for photocatalytic waste water treatment. G-C_3N_4 is synthesized through a simple pyrolytic treatment of urea. The synthesized photocatalysts were analyzed using XRD, FTIR, UV-DRS, SEM, and HRTEM. The dye degradation capability of the sample, g-C_3N_4, was determined using methylene blue as a model pollutant. When the absorbance was evaluated using UV-Visible absorption spectroscopy, the catalyst demonstrated a 97% increase in degradation rate. This is presumably due to the 2D shape of the g-C_3N_4 material, which effectively minimized charge carrier recombination in the catalyst. This study demonstrates the feasibility of integrating nano heterostructures with g-C_3N_4 to address environmental cleanup by enhancing visible light absorption.

Keywords: Pyrolysis, g-C_3N_4, XRD, SEM, Dye degradation.

CHNT-PP-03

Antimicrobial and Antioxidant Capabilities of Carbon Quantum Dots Derived from The Leaves of *Atriplex Hortensis*

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Carbon nanomaterials of size less than 10 nm, are called carbon quantum dots. They are materials subjected to active research due to their wide-ranging properties, such as stability in chemicals, high solubility in water, fluorescence, and economic feasibility. The use of the leaves of *Atriplex hortensis* (mountain spinach) as a source of carbon quantum dots and their potential utility as antibacterial agents and antioxidants, is the principal focus of this research. The method of hydrothermal synthesis was adopted to synthesize the carbon quantum dots. The carbon quantum dots, synthesized, were analyzed for their various properties by the experimental techniques of UV-visible spectrophotometry, fluorescence spectroscopy, and Fourier transform infrared spectroscopy (FT-IR). By using the methods of tube dilution and agar diffusion, the antibacterial activity of the carbon quantum dots was examined against *Bacillus* sp, *Pseudomonas* sp, and *Klebsiella* sp, *Escherichia coli*,. The findings suggested that the carbon quantum dots have a maximum antibacterial activity against *Pseudomonas sp.* The use of these carbon quantum dots as antioxidants was established through the DPPH assay. These findings establish the leaves of *A. hortensis*, as a potential source of carbon quantum dots with antimicrobial activity and antioxidant activity.

Keywords: Carbon dots; Green synthesis; *Atriplex hortensis* ; Antimicrobial activity, DPPH assay

CHNT-PP-04

Non-Enzymatic SnO_2 Biosensor For Point-of-Care Cholesterol Detection

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Cholesterol is an essential biomolecule responsible for multiple physiological functions. However, high cholesterol levels, mainly low-density lipoprotein cholesterol (LDL-C), can lead to a greater chance of cardiovascular diseases, especially strokes and heart attacks. Concerning this, there is a greater demand for sensitive and rapid detection of cholesterol, which encourages researchers to develop advanced biosensing technologies. In this work, we report a hydrothermal method to synthesize randomly arranged tin oxide (SnO_2) designed specifically for applications featuring cholesterol biosensing. X-ray Diffraction (XRD) and Raman spectroscopy, along with morphological characterization by field-emission scanning electron microscopy (FESEM), confirmed the essential structural and morphological properties of the synthesized SnO_2. The synthesized compound is coated on Nickel Foam (NF), which functions as the working electrode in the electrochemical workstation setup. In particular, the SnO_2-coated electrode showed improved cyclic electrochemical stability and efficiency in cholesterol oxidation. Electrochemical measurement of the synthesized metal oxide reveals excellent sensitivity, with a high value of 1518.04 $\mu A\ mM^{-1}\ cm^{-2}$, in addition to a low limit of detection (LOD) of 0.072 mM and a limit of quantification (LOQ) of 0.2416 mM. Importantly, the nanomaterial exhibits a response time of less than 2 seconds, and a broad linear range ranging from 0.2mM to 2mM highlighting its suitability for cholesterol-sensing applications. By achieving improved electrochemical efficiency and rapid response time, this nanomaterial shows an achievable strategy for designing cholesterol biosensors, meeting the essential demands of biomedical studies and diagnostic applications.

Keywords: Nonenzymatic Cholesterol Sensor, Amperometry, SnO_2 nanoparticle, Electrochemical Sensor, Sensitivity.

CHNT-PP-05

A Study On The Effect Of Carbon Dots As A Growth Enhancer For Agricultural Industry

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The population explosion has resulted in the increased demand of basic necessities like food and clothing for human beings owing to which research on the advanced agricultural techniques are found to evolve rapidly. Nanomaterials are assumed to play a prominent role in addressing the challenges faced from chemical/synthetic pesticides and fertlilisers by the agricultural industry. Carbon based nanomaterials with reduced environmental hazards and elevated biocompatibility is becoming a widely sort after candidate in nanofertilizer industry. C-dots are fluorescent nanocarbon carbon materials possessing excellent optical and electronic characteristics which find immense applications in sensor, biomedical and environmental sectors. Herein, nano C-dots derived from biowaste (*Aegle marmelos*) has been investigated for its role as a nano fertiliser. The C-dots are synthesised via facile hydrothermal method and has been characterised by advanced characterisation techniques such as UV-Visible absorption spectroscopy, Fluorimetry and FTIR spectroscopy. C-dots based nanofertilisers showed enhanced growth of plants under investigation at optimal concentration. This study casts light on the new avenues on the application of bio-derived C-dots as nanofertilisers.

Keywords: C-dots; Green synthesis; Fluorescence; Nanofertilisers; Agriculture.

CHNT-PP-06

Lignin Nanoparticles: Synthesis and Its Application In Wastewater Treatment

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Biomaterials in the nano size are promising high-value products with diverse applications. Lignin is an energy rich compound and it is found to be important in various applications. Burning it without further usage represents a foremost waste of natural resources. Hence, valorization of lignin into useful goods holds worth to bio-refinery concept for broader benefit to the society. Lignin has wide range of applications and can be isolated from agro-industrial waste. This helps to reduce production costs and pollution load from the environment. The amount of lignin in coconut coir fiber is fairly high (40–45%) compared to other biomass. It is extracted from coir fiber using a mildly alkaline solution and moist heat under pressure in an autoclave. Lignin nanoparticles of size approximately 35nm were directly synthesised from alkaline lignin extract by acid precipitation using a green reagent methane sulphonic acid accompanied with mild ultrasonication. LNPS have proved as biomaterials with potential applications in the field of adsorbtion of water pollutants. The applications of the synthesised lignin nanoparticles (lnps) were studied as an adsorbent in the removal of organic effluent, p-amino phenol a starting material used in the preparation of paracetamol. The adsorption isotherm and kinetic studies has been investigated. The adsorption process was confirmed by using techniques such as UV, FTIR, SEM and EDX studies.

CHNT-PP-07

A Short Overview Of The Photocatalytic Uses Of Luminescent Carbon Dots

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Nano carbon dots are a new class of carbon nanomaterials with dimensions less than 10 nm and unique electrical and optical characteristics. Carbon dots are an interesting material of the decade due to the large number of green sources available for their synthesis, as well as their numerous applications. Conventional semiconductor nanoparticles endowed with the ability to form electron-hole pairs have been widely exploited for photocatalytic applications, notwithstanding their inability to prevent electron-hole recombination. Carbon dots (C-dots), which are biocompatible and have good electron acceptor/donor properties, are a prospective candidate for improving the photocatalytic efficiency of metal chalcogenide semiconductor nanoparticles. This brief review provides a comprehensive overview of the use of C-dots as a supporting entity for various metal oxides and metal sulphides in advanced techniques such as photocatalytic waste water treatment, hydrogen generation via water splitting, and photocatalytic CO_2 reduction.

Keywords: Carbon dots, Dye degradation, Green synthesis, Hydrogen generation, Photocatalysis

CHNT-PP-08

Application of Strontium Nanoparticles In Biosensing: A Review

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Strontium belonging to the alkaline earth metals has an ideal perovskite structure at room temperature and is similar to calcium in several ways. Strontium-titanium nanoparticles have been found to have large band gaps and can be turned into n-type semiconductors. Additionally, strontium is biocompatible and has useful electrochemical properties such as fluorescence as well as its behavior as a supercapacitor which can be harnessed to electrochemically assess biological matter during sensing studies. Some studies show that strontium doped nanoparticles show better biomedical and supercapacitor abilities. Strontium nanoparticles have been used for various purposes from gas sensors, bone regenerative therapy to photocatalysis. They have, however, not been used very often in electrochemical biosensing applications. Regardless, the scant research that exists is quite promising and strontium nanoparticles have been used to electrochemically sense calcium channels alone, identifying viral and bacterial loads which could further be developed into diagnostic tools. This article aims to provide a comprehensive review and analysis of the research and results published with respect to electrochemical biosensing using strontium nanoparticles.

Keywords: Strontium, nanoparticles, biosensing, literature review, electrochemical sensing

CHNT-PP-09

Biosynthesis of Cu/Mo Nanohybrid Using Plant Extract of *Cissus Quadrangularis* and In-Vitro Assessment of Its Anti-Diabetic Properties

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In this current study we have utilized *Cissus quadrangularis* for the synthesis of Cu/Mo nanohybrid. *Cissus quadrangularis* popularly known as "bone joint" or "mangravalli" in Kannada, a member of the Vitaceae family thriving in temperate regions, offering manifold medicinal benefits and significant biomedical applications. For the synthesis of the nanohybrid, plant-extract obtained after conducting Soxhlet extraction was used, with methanol as the solvent. The investigation involved analysis of the methanolic leaf and stem-extract to identify constituents and to quantitatively determine the phytochemicals. Characterization of synthesized Cu-Mo nanoparticles was achieved through SEM, XRD, and EDAX analyses to delineate their shape and size. SEM, XRD, and EDAX analyses indicated nanoparticle sizes of around 78 nm for Cu and 130 nm for Mo. Phytochemical scrutiny unveiled the presence of flavonoids, tannins, and cardiac peptides in the leaf extract, with flavonoid concentration measuring approximately 164 mg/mL. This study represents a comprehensive exploration of the phytochemical composition and determination of anti-diabetic potential of *Cissus quadrangularis* leaf extracts . An alpha-amylase inhibition assay was executed to gauge the nanoparticles' anti-diabetic efficacy, revealing Mo nanoparticles to possess superior properties compared to Cu nanoparticles. The synthesized nanoparticles display promising anti-diabetic effects, suggesting prospective applications in drug formulation and nanotechnology for combating various diseases. Expansion of Research is imperative to fully harness these properties for therapeutic endeavours. Further determination of anti-diabetic potential of *Cissus quadrangularis* leaf extracts is on.

Keywords: Nanoparticles, Bimetallic, Phytochemicals, Anti-diabetic assay, Soxhlet, Methanolic extract.

CHOC-OP-01

Crafting Innovative Curcumin Analogues: Design, Synthesis, Characterization

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The primary component in turmeric, curcumin, has long been known for its antioxidant and anti-cancer qualities. Its potential as an anticancer agent has aroused a great deal of interest in the scientific community recently. The poor bioavailability and fast metabolism of curcumin pose significant obstacles to its practical use in cancer therapy. In order to tackle these problems and realize the complete therapeutic potential, various analogues have been synthesized. Extensive literature review was carried out. *In-silico* studies were performed using various docking platforms to recognize the top molecules, that show most binding affinity. The synthesis protocol was developed along with, conventional method of synthesis and purification. Characterization is carried out by monitoring the rate of reaction by thin layer chromatography, melting point, UV- spectroscopy and IR spectroscopy. In conclusion, the pressing need for better cancer treatments motivates research on curcumin analogues' anticancer potential. These analogues have the potential to overcome curcumin's drawbacks and open the door to more potent and focused anticancer therapies.

Keywords: Anti-cancer, Anti-oxidant, Curcumin, *in-silico* studies

CHOC-OP-02

Evaluation Of A 4-Amino-Antipyrine Based Schiff Base As Corrosion Inhibitor For Steel Material

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Electrochemical experiments such as potentiodynamic polarization, electrochemical impedance spectroscopy, and gravimetric studies have been used to examine the corrosion inhibitory efficacy of 4-[(4-Nitrobenzylidene)-amino]-antipyrine (4-NBAAP) on mild steel (MS) in 1M HCl. 4-NBAAP inhibits the corrosion of MS through a mixed inhibition mechanism, according to the electrochemical investigation.The efficiency of 4-NBAAP increases with an increase in inhibitor concentration and decreases with an increase in temperature. The adsorption of 4-NBAAP molecules on the MS surface follows the Langmuir adsorption isotherm. To find the relationship between 4-NBAAP molecular structure and inhibitive effect, a few thermodynamic parameters were computed. The experimental results obtained from gravimetric and different electrochemical investigations, prove the superiority of the inhibitor at higher concentration in controlling the corrosion process of the steel in aggressive environment. Also, quantum chemical studies were performed to provide further insight into the inhibition mechanism.

Keywords: Mild steel/(MS); Corrosion Inhibitor; Acidic corrosion; absorption isotherm; Polarization & Potentiodynamic; impedance spectroscopy (EIS).

CHOC-OP-03

Impact of Concentration of Citric Acid on Bacterial Growth

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Citric acid, a tricarboxylic acid found in citrus fruits, exhibits antibacterial properties due to its acidic nature. This study investigated the effect of different concentrations of citric acid on the growth of Lactobacillus bacteria. Citric acid concentrations of 1%, 5%, and 10% were prepared, and agar plates with Lactobacillus cultures were exposed to these concentrations. The results showed that higher concentrations of citric acid inhibited bacterial growth more effectively, with 10% citric acid completely inhibiting growth within a 4mm radius around the paper discs soaked in citric acid. This study highlights the potential of citric acid as a natural antibacterial agent and emphasizes the importance of concentration in determining its effectiveness against bacterial growth.

Keywords: Citric acid, antibacterial properties, Lactobacillus, concentration-dependent inhibition, microbial growth, food preservation.

CHOC-OP-04

Mixed-Ligand Metal Complexes of Curcumin for Catalytic Applications

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The solvent methanol, mediated procedure for the synthesis of Biaryls catalysed by an Iron (III) Curcumin complex was efficiently demonstrated in the present work. The catalyst showed excellent efficiency in C–C coupling reactions forming biphenyls respectively. The efficacy of catalytic system was investigated by carrying out the synthesis of biphenyls in two sets of reactions, by varying the catalysts. In the first and second set of reactions, FeCl(Cur) and NiCl(Cur) complexes were used as the catalyst and the results were compared. The performance of all the catalysts were evaluated and the reaction conditions were optimized by studying the effects of catalyst concentration, solvent, and the bases. In FeCl(Cur), the reactions are facilitated by yielding up to 85% in 3 h; whereas, in the NiCl(Cur) complex as catalyst resulting up to 82% yield in a shorter duration of 2 h. Moreover the catalyst was recyclable and was reused up effectively. Hence, the two proposed catalysts are effective for the Suzuki coupling reaction.

Keywords: Suzuki C-C coupling; Aryl halides; Aryl boronic acids; Transition metal complexes; biphenyls synthesis.

CHOC-OP-05

Separation and Simultaneous Determination of Multiple Drugs by Chromatographic Method

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The method development and validation for the determination of Metformin HCl (MTF), Glimepiride (GLD), and Pioglitazone HCl (PGT) in tablet dosage forms using RP-HPLC-UV in accordance with ICH guidelines. The chromatographic method was developed with the mobile phase: 0.05 N ammonium acetate pH-4.7 adjusted with 0.1 M glacial acetic acid and methanol in the ratio (25:75 v/v) and the stationary phase column, C18, 25 x 4.6 mm, 5 µ. The flow rate was set at 1.5 mL min-1. MTF, GLD, and PGT eluted at 1.4, 5.0, and 8.8 minutes, with a detection wavelength of 230 nm. The total run time was determined to be 15 minutes. The obtained results were well within the limits. As a result, the data were deemed acceptable. The limits of detection (LOD) were found at 1.0, 2.0 and 1.0 µgmL-1, while the limits of quantification (LOQ) were 3.5, 7.0 and 3.5 µgmL-1, respectively. MTF and GLD PGT had linearity ranges of 10 to 150 µgmL-1, 5 to 250 µgmL-1, and 5 to 300 µgmL-1, respectively. The accuracy parameter was tested with 50%, 80%, and 120% solutions. Robustness was assessed through deliberate modification of actual method conditions such as flow rate, column oven temperature, and mobile phase. Despite the fact that the chromatographic conditions were changed, the results of the proposed method remained relatively consistent. As a result, the proposed method for determining MTF, GLD, and PGT was robust. The graphs show drug concentration versus area of MTF, GLD, and PGT peaks. The regression coefficients for both drugs were found to be greater than 0.999 using the established method. The proposed method was straightforward, robust, precise, and cost-effective. The same method can be used for LC-MS/MS to determine MTF, GLD, and PGT drugs in pure and pharmaceutical formulations.

Keywords: RP-HPLC, Assay, Anti-diabetic, Metformin HCl, Glimepiride and Pioglitazone HCl.

CHOC-OP-06

Synthesis And Physiochemical Studies of (E)- ethyl 3-(2,4–dihydroxyphenyl)but-2-enoic acid

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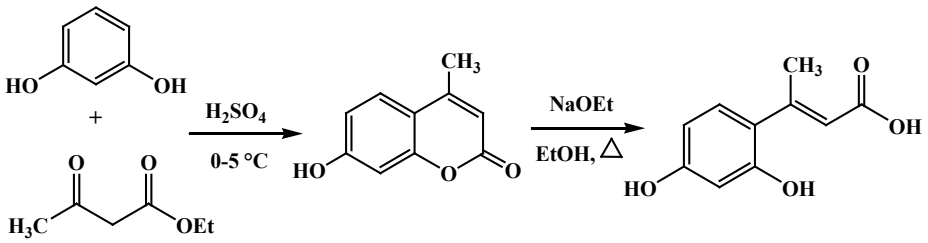
4- Methylumbelliferone has represented as an attractive compound for research. This interest is based on much evidence that indicated the significance of its applications in the photo- and chemo-therapy of various cancer types . In this concern, it is found that the antitumor property of 4-methylumbelliferone (MU) can be improved by the insertion of specific substituents at defined positions.

Condensation reaction of resorcinol with ethylacetoacetate using conc.sulfuric acid to synthesis 7-hydroxy -4-methyl coumarin or 4-Methyl Umbelliferone (4MU) was carried out through pechmann reaction. The product 4- methyl umbelliferone (pechmann product) was treated with sodium ethoxide using ethanol as a solvent . The reaction showed good progress which is monitored by TLC . The reaction was successed. Charecterization were carried out using IR, H^1-NMR and Mass Spectra. The fluorescencent activity was shown by the reaction mixture.



The normalised absorption and fluorescence spectra of (E)-ethyl 3-(2,4 dihydroxyphenyl)but -2-enoic acid probes in different solvents with varying polarity were recorded.

Key Words: 4-methylumbelliferone, Dihydroxy Phenol, Coumarins,Pechmann cyclization, Ethanoic acid.

CHOC-PP-01

Standardized Method To Extract Phenolic Compounds from *Acacia. nilotica* For Enhanced Antioxidant Activity

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Oxygen is vital for aerobic life processes. However, about 5% or more of the inhaled O_2 is converted to reactive oxygen species (ROS). When the balance between ROS production and antioxidant defense mechanism of the cell is lost, 'oxidative stress' results which through a series of events deregulates the cellular functions leading to various pathological conditions including cardiovascular dysfunction, neurodegenerative diseases, gastroduodenal pathogenesis and several types of cancer .The use of synthetic antioxidants to prevent free radical damage is frequently accompanied by toxic side effects. Safer antioxidants from plant origin are essential to prevent the progression of free radical mediated disorders. Current research is directed towards finding naturally-occurring antioxidants of plant origin. Traditionally, this plant is used widely for the treatment of various ailments, but scientifically few of them were screened out. It is used as an antiseptic, demulcent, purgative and an effective tonic in diabetes mellitus.The leaves, dried fruits (pods) and branches of *Acacia nilotica* were studied for total phenolic contents, free radical scavenging activities (FRSA)and antioxidant activity(AOA). The crude extract obtained from 50 % MeOH containing 1% HCl was found to have greater phenolic content and antioxidant and FRSA activity compared to other solvents (ethylacetate, methanol, ethanol and water).All the three parts were found to have good phenolic content and their AOA and FRSA results were very promising. It can be an economically viable source for the development of nutraceuticals. HPLC of the extract has revealed the presence of several polyphenols like caffiec acid, gallic acid, ellagic acid and ferulic acid.

Keywords: Antioxidants; Free radical scavenging activity; HPLC ; Nutraceuticals

CHOC-PP-02

Development And Evolution Of Novel Curcumin Analogues As Anti-Cancer Agents

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Herewith we report the Isolation of Curcumin from rhizome of turmeric (Curcuma longa) at 100^0C with toluene as solvent and this is subjected to distillation to remove Toluene and the residue is treated with petroleum ether and stirred and filtered. Obtained curcumin is used to make Novel Isoxazole, Pyrazole & Coumarin curcumin analogues by treating with Hydroxyl amine hydrochloride, Isoniazide and ethyl acetoacetate these novel analogues are characterized using TLC, UV -visible spectroscopy FT-IR and NMR and these novel analogues screened for Invitro MTT assay -cytotoxic activity against Hela Cell lines by taking Doxorubicin as standard and it is found that the analogue coumarin curcumin shown better cytotoxicity activity than their parent curcumin and also standard doxorubicin this one would be commercially feasible economically viable drug candidate from curcumin-based research and we want explore the curcumin's potential toward improving its therapeutic applications.

Keywords: Curcumin (Curcuma longa), Isoxazole, Pyrazole & Coumarin curcumin and cytotoxic activity

CHOC-PP-03

Method Development and Validation for the Simultaneous Determination of drugs by Reverse Phase -High Performance Liquid Chromatography (RP-HPLC)

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The stability indicating method development and validation for the determination of Metformin HCl (MTF) and Glimepiride in tablet dosage forms by RP-HPLC UV as per ICH guidelines. The chromatographic method was developed by the mobile phase: 0.05 N ammonium acetate pH-4.5 adjusted with 0.1 M glacial acetic acid and methanol in the ratio (40:60 v/v) and stationary phase Column,C18, 25 x 4.6 mm, 5 µ. The flow rate was fixed at 1.5 ml min^{-1}. Sharp and clear separated peaks of MTF andGLD eluted at 1.4 min and 8.8 min respectively, with wavelength of detection at 228 nm**.** The total run timewas found to be 15 minutes. The outcomes obtained were well within the limits. Hence, data are found to be acceptable. The Limit of Detection (LOD) was found at 0.5 μgmL^{-1} and 1.65 $\mu gmL^{-1}$and Limit of Quantification (LOQ) at 1.5 μgmL^{-1} and 5.5 μgmL^{-1}, respectively. The linearity range concentration was found to be 5 to 50 μgmL^{-1} and 10 to 60 μgmL^{-1} for MTF and GLD respectively. Accuracy parameter was performed with 50% 80%, and 120% solutions. Robustness was carried out with deliberate modification withactual method conditions like flow rate, column oven temperature and mobile phase. Even though the outcomes chromatographic conditions were modified, the results of the proposed method outcomes were not varied considerably. Hence, the proposed method for the determination of MTF and GLD is robust. The graphs were plotted with drug concentration versus area of MTF and GLD peaks. The regression coefficients of both drugs were found to be more than 0.999 in the established method.The proposed method was simple, robust, precise and cost effective. The same method can be adopted for LC-MS/MS method. for the determination of MTF and GLD drugs in their pure and pharmaceutical formulations.

Keywords: RP-HPLC, Assay, Anti-diabetic, Metformin Hydrochloride, Glimepiride,

CHOC-PP-04

Indium Chloride-Catalyzed One-Pot Synthesis of Multifunctional 1,4-Dihydropyridines

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We have developed a promising new method for creating multifunctional 1,4-dihydropyridines, molecules with potential applications in pharmaceuticals. This one-pot approach streamlines the process by combining four ingredients (aromatic aldehydes, ethyl cyanoacetate, acetylenedicarboxylates, and arylamines) in a single reaction vessel. The technique relies on a cyclocondensation reaction catalyzed by indium chloride. This catalyst accelerates the reaction at room temperature in ethanol, significantly reducing reaction time to just 2 hours. Compared to existing methods, this approach boasts several advantages. It's faster, delivers higher yields of the desired product, and avoids harsh reaction conditions.

Additionally, the one-pot nature and use of a common solvent simplify the process and minimize waste. Another key benefit is the use of a multicomponent reaction (MCR). MCRs allow for the incorporation of a wider variety of functional groups into the final product, potentially leading to a diverse range of potential drug candidates. Furthermore, the reaction precipitates the product directly from the mixture, simplifying purification. This research offers a significant advancement for synthesizing these potentially valuable molecules.

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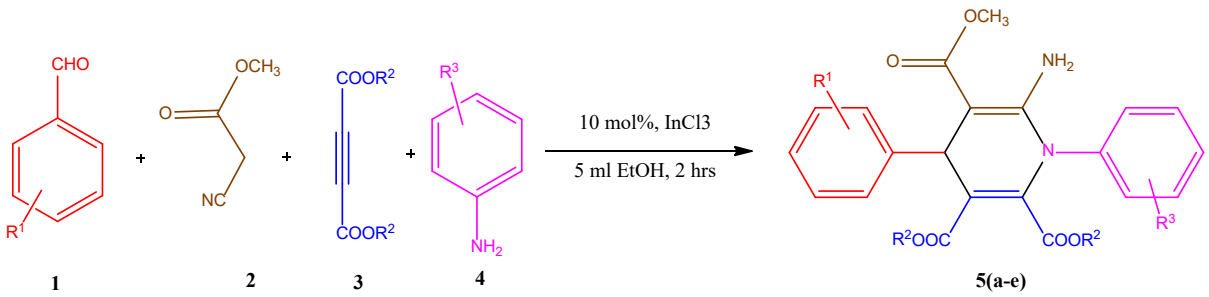

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Keywords: Multicomponent; One-pot, High yield; 1,4-dihydropyridines; Indium chloride

CHOC-PP-05

Revolutionizing Hair care: Creating a Eco-Friendly Protein Shampoo and Conditioner from Repurposed Cooking oil to Combat Hair Fall and Enhance Smoothness

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The burgeoning demand for eco-friendly personal care items has spurred innovative research into formulations utilizing recycled materials. This study investigates the conversion of discarded cooking oil into a protein-based shampoo and conditioner. The process involves emulsification and saponification to transform the used oil into a viable ingredient. The experimental procedure includes collecting and filtering the cooking oil, followed by chemical reactions to obtain fatty acids. These are then integrated into formulations alongside other natural and biodegradable components to create the final products. Physicochemical properties such as pH, viscosity, foaming ability, and protein content are evaluated to characterize the formulations. Consumer trials assess the efficacy of the shampoo and conditioner in terms of cleansing, conditioning, and hair strengthening. This project's outcome contributes to sustainable personal care product development by repurposing waste materials, thereby reducing environmental impact and promoting circular economy practices. The findings underscore the potential of repurposed cooking oil as a valuable resource for producing eco-friendly protein-based hair care products, meeting the escalating demand for sustainable alternatives in the cosmetics industry.

Keywords: Repurposed cooking oil, Protein-based shampoo and conditioner, Eco-friendly formulations, physicochemical properties

CHOC-PP-06

Quinoline Conjugates for Enhanced Antimalarial activity: A Review on Synthesis by Molecular Hybridization and SAR Investigation

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Malaria, caused by the various *Plasmodium falciparum* strains, has been one of the most deadly diseases spread all across the world. Over the years, several researchers have been employed to analyse molecular hybridisation technique for the synthesis of combination drugs in order to overcome the resistance gained by the parasite against the existing drugs. Hence, some of the significant contributions since 2019 till date have been summarised in the present review. Based on structure, the hybrids have been classified into bi-pharmacophores – having two pharmacologically active groups, tri-pharmacophores – having three pharmacologically active groups, metal-based and other miscellaneous hybrids. A thorough study of existing molecules could also reveal new leads for the development of anti-malarial agents with efficacy better than the preceding ones.

Keywords: *Plasmodium falciparum,* bi-pharmacophores, tri-pharmacophores

CHPM-OP-01

One Pot Synthesis of Zwitterionic Polymeric Nanoparticles for Fabrication of Dye Removal Membranes

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Zwitterionic moieties are well known for their ability to form a hydration layer due to the interaction of water molecules with the cationic and anionic moieties of the zwitterion. This hydration layer formed via hydrogen bonding gives rise to its antifouling property. Zwitterionic polymeric nanoparticles of poly(MBAAm-co-SBMA) were synthesized using a crosslinker (MBAAm) and zwitterionic moiety (SBMA) via free radical reaction using (AIBN) as initiator and acetonitrile (ACN) as solvent. The nanoparticles were characterized by Field Emission Scanning Electron microscopy (FESEM), Fourier Transform Infrared Spectroscopy (FTIR), X-Ray Diffraction (XRD) and dynamic light scattering and zeta potential. The PSf flat sheet membranes incorporated with the nanoparticles were tested for dye rejection using Reactive Black 5 (RB5) and Reactive Orange 16 (RO16) dyes. The membranes were subjected to rejection studies and their porosity and hydrophilicity were also determined. The optimized membrane showed 98.63% rejection of 20 ppm RB5 and 78.75% rejection of 20 ppm RO16.

Keywords: Zwitterionic, membranes, nanoparticles, water treatment, polysulfone

CHPM-OP-02

Zwitterionic-Mil-53(Fe) Incorporated PVDF Membranes for Heavy Metal/Salt Removal From Contaminated Water

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The detrimental effect of heavy-metal ions on the water bodies has led to serious concern regarding the human health and ecosystem. Membrane technology is one of the popular ways to treat contaminated water in this regard. In this work, poly (vinylidene fluoride) thin-film composite membranes have been fabricated incorporating zwitterionic-modified MIL-53 metal organic framework. Initially, the synthesized zwitterionic-MOF was characterized using BET, FE-SEM, XRD, particle size and zeta-potential. Then the modified MOF was embedded into the polyamide layer of PVDF-TFC. The performance of thus resulting membrane was evaluated by studying pure water flux, heavy metal and salt rejection capability. The hydrophilicity of the membrane was studied analysing the water contact angle and water uptake studies. The optimized membrane exhibited an enhance pure water flux of 26.37 $Lm^{-2}h^{-1}$ with salt rejections of 54.9% and 84.18% for NaCl and $MgSO_4$ respectively. The heavy metals chosen for the study were lead and cadmium which gave 97.05% and 96.93% respectively.

CHPM-PP-01

Revitalizing Radiance: Harnessing the Power of Millet in Body Lotion Formulations

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Millet has played an important role in Indian cuisine since ancient times. These grains have multiple health benefits and are rich in nutrients, fiber, and minerals. Millet is also great for our skin. But few people know this. This study is based on the production of body lotion from foxtail millet. The millet grains have an anti-aging effect. It contains lysine and methionine, ensuring smooth and youthful skin. These Vitamins and minerals contained in millet keep the skin healthy.

This study focuses on using millet starch as a versatile ingredient in combination with aloe vera gel to create new skin care products. The main ingredient in the cream is millet starch, which is obtained from cereals. Its high amylopectin content contributes to desirable thickening and stabilizing properties. Another key ingredient, Millet starch is obtained by a simple and efficient method of washing, soaking, crushing, and separating. The starch was then modified to improve its texture and emulsifying properties, contributing to the consistency and stability of the cream. Aloe Vera Gel has been added to the cream to improve hydration. The cream's natural and sustainable composition addresses the growing consumer preference for eco-friendly cosmetic options. This formulation aims to leverage the nutritional benefits of millet while providing a unique and potentially beneficial skin care product. This research will contribute to the diversification of millet-based products and facilitate the use of alternative ingredients in the cosmetic industry.

Keywords: fox tail millet, millet starch, anti-aging, emulsifier.

CHPM-PP-02

Studies On Zwitterionic Nanocomposite Ultrafiltration Polyphenylsulphone Membrane For Protein Rejection Applications

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The contamination of water from a wide variety of proteins discarded from various industries is a genuine ecological issue attributable to their potential human lethality. Utilizing an efficient process is necessary for the urgent removal of toxic and value-added proteins found in wastewater. Present study explains the zwitterionic nanoparticles were synthesized using the monomers[2-(methacryloyloxy) ethyl]dimethyl-(3-sulfopropyl)ammonium hydroxide (DMAPDS) and 1-vinyl-2-pyrrolidone (VA), and thecrosslinker N,N′- methylenebis(acrylamide) (MBAm) are utilized for the synthesis of P(MBAm-*co*-DMAPDS-*co*-VA) nanoparticle via distillation precipitation method (DPP) and the synthesized nanoparticle was incorporated into polyphenylsulfone (PPSU) flat sheet membrane. It has been observed that zwitterionic nanoparticles exhibited outstanding improvements in the hydrophilicity, porosity and water uptake capacity. The highest pure water flux of the modified membrane 249.4 $Lm^{-2}h^{-1}$ than the pristine of 70.6 $Lm^{-2}h^{-1}$and the flux recovery ratio as well asreversible fouling was enhanced by 29.7% and 11.2% respectively. The protein rejection of bovine serum albumin (92.1%), egg albumin (80.3%) and pepsin (60.4%). Overall, the fabricated modified membranes showed better protein flux than the pristine membranes.

Keywords: Polyphenylsulfone, Zwitterions, distillation-precipitation polymerization, Ultrafiltration, protein rejection.

CHPM-PP-03

Hydrophilic Polymer Microspheres Immobilised With Polyphenylsulfone Ultrafiltration Membranes: A One-Step Synthesis And Characterization Approach for Protein Rejection Applications

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An effective single-step polymerization was followed for the synthesis of hydrophilic P(MBAm-*co*-MAA) microspheres. The distillation-precipitation polymerization (DPP) technique utilized N,N′-methylenebis(acrylamide) (MBAm) as a crosslinker, methacrylic acid (MAA) as a monomer, solvent acetonitrile (ACN) and an initiator 2,2-azobisisobutyronitrile (AIBN) for synthesizing the P(MBAm-*co*-MAA) polymer particle. Simultaneously, in the reaction system, the polymer particles were formed as a precipitate and acetonitrile from the reaction was distilled out. The reaction takes place without addition of any surfactant or stabilizers. The morphology of the resultant microspheres, which were characterized by field emission scanning electron microscopy (FESEM), transmission electron microscopy (TEM), attenuated total reflectance fourier-transform infrared spectroscopy (ATR-FTIR), X-ray diffraction (XRD) and Brunauer-Emmett-Teller (BET) analysis. These microspheres were used as an additive for improving the performance of the fabricated membrane. The modified membranes showed increased hydrophilicity, porosity and water uptake. Membranes also exhibited improved permeability (63.7 $Lh^{-1}m^{-2}bar^{-1}$), flux recovery ratio (80.7%) and the highest protein rejection values of 94.8% (bovine serum albumin), 68.4% (pepsin), 86.9% (egg albumin) were observed. Therefore, the as-prepared membrane can potentially be used for protein removal from industrial wastewater.

Keywords: Polyphenylsulfone, polymeric microspheres, distillation-precipitation polymerization, Ultrafiltration, protein rejection.

CHNT-PP-10

The Study Of The Zinc Oxide-Based Polythiophene Composites' Synthesis, Characterisation, and Electrical Characteristics.

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The synthesis of polythiophene (PTP)/ZnO composites is studied using an in-situ oxidative polymerization technique. The FTIR, XRD, and SEM characterisation of PTP and the associated composites have demonstrated the effectiveness of the chemical synthesis. FTIR absorption peaks verify ZnO presence in PTP backbone and provide an explanation for ZnO greater interaction with PTP. The PTP composite's substantially higher conductivity value is explained by this interaction, assuring its superior performance in upcoming electronics. Thermal analysis shows no change in PTP thermal stability with other metal oxides, ruling out the usage of these composites for applications at higher temperatures.

Keywords: Polythiophene, ZnO , Composites, Insitu chemical oxidative polymerization Characterisation

CHNT-PP-11

Synthesis And Evaluation of Carbon-Dot-Modified TiO_2 For Visible Light-Mediated Photocatalysis In Dye Degradation Applications

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Titania nanophotocatalysts are well-known for their UV-induced photocatalytic ability to degrade organic colors. This paper describes a novel approach in which TiO_2 nanoparticles are structurally modified by integrating carbon dots (CDs), with the goal of modifying their band-edge and so improving their optical properties. Carbon nanoparticles are CDs that are less than 10 nm in size and have organic functional groups on them. Carbon dots exhibit distinctive optical and electronic characteristics, rendering them highly suitable for a wide array of applications. In this study, carbon dots were synthesized from guava juice via the hydrothermal method. The resulting TiO_2 and CDs@ TiO_2 nanomaterials underwent characterization utilizing XRD, FTIR, UV-DRS spectroscopy, SEM, and HRTEM techniques. Evaluation of dye degradation using crystal violet dye revealed a notable enhancement in degradation efficiency (98%) for CDs@TiO_2 compared to TiO_2 (67%). This study highlights the vital role of carbon dots in improving photocatalytic performance by reducing charge carrier recombination due to their electron acceptor-donor properties. It emphasizes the ability of carbon dots obtained from ecologically acceptable sources to act as a supporting component in the development and refinement of effective visible light-based photocatalysts.

Keywords: TiO_2; CDs; Dye degradation; Photocatalysis; Waste water treatment.

CHNT-PP-12

Exploring Carbon Bio-Dots As Sustainable Nano-Fertilizers: An Investigative Study

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Amidst the global challenges of burgeoning populations and rapid urbanization, agricultural productivity faces a critical juncture. Traditional approaches relying heavily on chemical pesticides and fertilizers have not only strained agricultural resources but also posed risks to human health and the environment. Recognizing the need for transformative solutions, this study explores the potential of nanomaterials to revolutionize agronomy. Specifically, it investigates the utilization of carbon dots (C-dots) for agricultural enhancement. Through the synthesis of C-dots and nitrogen-doped C-dots (N-CDs) from biowaste, the study presents a sustainable approach to agricultural innovation. Advanced characterization techniques confirm the successful formation of C-dots, while antimicrobial assessments demonstrate the effectiveness of N-CDs against gram-negative microbial strains. Furthermore, growth evaluations conducted on moong daal and groundnut highlight the superior growth-promoting properties of N-CDs compared to CDs, attributed to nitrogen's role in enhancing photosynthesis. This research underscores the potential of environmentally friendly C-dot and N-CD-based agricultural bio-nano fertilizers, offering a promising pathway toward sustainable agricultural practices.

Keywords: Carbon Dots, Bio-Nanofertilizer, Environment Friendly, Agronomy, Antimicrobial efficacy.

Physical Sciences Abstracts

PAM-OP-01

Advancing Urban Mobility: A Holistic Approach to Traffic Management

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Abstract: Efficient traffic management is vital for urban sustainability and public safety. This paper proposes a comprehensive strategy to tackle contemporary traffic challenges. Firstly, we introduce a computer vision system to identify non-helmet riders and capture their vehicle numbers, promoting road safety and regulatory enforcement. Secondly, our solution employs advanced image processing to identify signal violators, enhancing enforcement measures. Moreover, we outline smart traffic management strategies, integrating real-time analytics and AI to optimize flow, reduce congestion, and minimize travel time. Emphasizing adaptability, our approach dynamically adjusts signals to match traffic demand. Additionally, we advocate for radio frequency recognition to expedite emergency vehicle passage through traffic. This system, clearing signals for emergencies, significantly improves response times and urban safety. Our framework offers an innovative, holistic approach to modernize traffic management, promoting safer, more efficient urban mobility.

Keywords: Traffic management, holistic approach, urban mobility, AI

PAM-OP-02

AI Guardians for Biodiversity Treasure

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Abstract: India boasts a remarkable biodiversity, with over 100,000 species of animals and plants, many of which are endemic and found nowhere else on Earth. Effective monitoring and conservation of this natural wealth is crucial but challenging using traditional methods alone. This project proposes an innovative solution by harnessing the power of artificial intelligence (AI) and computer vision technology. The core approach involves training an AI system on a vast dataset of images to enable real-time detection and identification of wild species from camera trap footage and aerial drone videos. Once deployed across India's protected areas, this system will alert forest officials about the presence and locations of various animals and plants, including endangered and endemic species like the Indian giant squirrel or Nagaland tree fern.

This locational data can guide targeted efforts for tagging/tracking animals, prevent poaching by dispatching drones to investigate prolonged stillness, and monitor plant populations at risk of extinction to aid reforestation. Moreover, during summer months, the AI can identify areas with depleted water sources, allowing timely intervention to provide water for wildlife and prevent them from venturing outside forests. By seamlessly integrating cutting-edge AI capabilities with existing conservation initiatives, this project aims to revolutionize the monitoring and preservation of India's rich biodiversity. It offers a scalable, accurate, and efficient solution to safeguard the country's unique natural heritage for generations to come.

Keywords: Artificial Intelligence, Biodiversity, computer vision technology, endangered species, forest monitoring, real-time detection.

PAM-OP-03

Adopting and Expanding More Guidelines For Artificial Intelligence Generation From Military Uses To Health Care Applications

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Abstract: This research deals into the Ethical concerns surrounding the uses of generative AI in Healthcare, comparing them to ethical guidelines in the Military. By analysing the similar challenges in both fields, such as making urgent decisions that can greatly impact lives, it highlights important ethical factors like transparency, bias, and inequality. Although generative AI is gaining traction in medical studies, its ethical aspects are still largely unexplored, resulting in its adoption without proper ethical guidelines. The paper suggests a practical strategy to tackle these concerns by utilizing the moral guidelines set in the military setting. By highlighting the significance of ethical contemplation and accountable implantation, it seeks to encourage the ethical incorporation of generative AI into Healthcare operations, ultimately ensuring patient welfare and safety.

Key words: Artificial Intelligence, Health Care Application, Ethical guidelines, Patient welfare, Medical Studies.

PAM-OP-04

Artificial Intelligence and Machine Learning in Healthcare

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AI or Artificial Intelligence, refers to the development of computer systems capable of performing tasks that traditionally require human intelligence, such as learning, reasoning, problem-solving, perception, natural language understanding, and environmental interaction.

AI aims to create systems that emulate human cognitive abilities and can adapt to new situations without explicit programming for each task. AI is used in healthcare especially for analysing patients medical history and develop treatment with low risk and higher efficiency. This paper delves into the applications and benefits of AI in healthcare, exploring how it enhances various medical processes, from diagnosing diseases to formulating optimal treatment plans for critical illnesses like cancer.

Robotic surgical equipment integrated with AI assists surgeons in performing surgeries more effectively by reducing physical errors and providing real-time information during procedures. AI brings numerous advantages to healthcare, including cost savings, improved decision-making, and streamlined automation of services. It also enables faster diagnosis and enhances treatment planning.

Like many other industries, AI is poised to revolutionize the healthcare sector in the coming years, driving improvements in facility operations, patient diagnoses, treatment development, and overall health outcomes. The availability of healthcare data and different methods for analysing this data made AI successful in healthcare sector. Additionally, AI is expected to contribute to the discovery and development of new medical treatments and cures.

Keywords: Artificial Intelligence, healthcare, Machine Learning, Diagnose

PAM-OP-05

Analysis of Use Cases: Asynchronous v/s Parallel Programming

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Abstract: As software systems continue to evolve, developers face the challenge of optimizing performance while ensuring responsiveness and scalability. Two prevalent approaches to addressing this challenge are asynchronous and parallel programming paradigms. This paper presents a comprehensive analysis of these approaches in various use cases, evaluating their effectiveness in achieving performance goals and managing complexities inherent in modern software systems. The analysis begins by defining asynchronous and parallel programming paradigms, highlighting their fundamental differences and common application scenarios. Subsequently, it examines use cases where each paradigm excels, such as web server applications, real-time systems, and data processing pipelines. Through a comparative study, the paper elucidates the trade-offs associated with each approach in terms of concurrency control, resource utilization, and code maintainability.

Keywords: asynchronous programming, parallel programming, performance optimization, concurrency control, use case analysis.

PAM-OP-06

Conversational AI Unveiled: Exploring ChatGPT's Origins, Applications, Challenges, Boundaries, and Future Prospects

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In recent years, the landscape of scientific research has undergone a profound transformation due to the advancements in artificial intelligence (AI) and machine learning. We begin by exploring its origins, development, and underlying technology, before examining its wide-ranging applications across industries such as customer service, healthcare, and education. We also highlight the critical challenges that ChatGPT's faces, including ethical concerns, data biases, and safety issues, while discussing potential mitigation strategies. Finally, we envision the future of ChatGPT's by exploring areas of further research and development, focusing on its integration with other technologies, improved human-AI interaction, and addressing the digital divide. Additionally, we address critical challenges facing ChatGPT's, including ethical concerns, data biases, and safety issues, while proposing potential mitigation strategies. Looking ahead, we envision the future of ChatGPT's by exploring avenues for further research and development, emphasizing its integration with other technologies, enhanced human-AI interaction, and efforts to bridge the digital divide. This re- view offers valuable insights for researchers, developers, and stakeholders interested in the ever-evolving land- scape of AI-driven conversational agents. The paper presents several ethical issues in existing computing domain and how ChatGPT's can invoke challenges to such notion. This work includes limitations of ChatGPT's. Despite controversies and ethical concerns, ChatGPT's has garnered remarkable attention from academia, research, and industries within a short span of time.

Keywords: ChatGPT, Language model, GPT-3.5, Generative AI, Conversational AI, Context understanding, Natural language processing.

PAM-OP-07

Gesture Recognition with Media Pipe: Redefining User Interactions through Vision-Based Technology

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Abstract: This study delves into the transformative impact of MediaPipe technology in reshaping user interfaces through gesture recognition. With the surge in smart device usage and the quest for seamless interaction, gesture recognition emerges as a pivotal solution in bridging the human-machine gap. MediaPipe, a versatile framework for constructing cross-platform multimodal applied ML pipelines, emerges as a cornerstone in this pursuit. Leveraging the robust capabilities of MediaPipe, this research focuses on the development and deployment of a vision-based gesture recognition system aimed at revolutionizing user interactions. By integrating deep learning models and real-time processing, MediaPipe facilitates precise detection and interpretation of hand gestures, fostering intuitive and natural user interfaces. This abstract offers a glimpse into the potential of MediaPipe-driven gesture recognition to transform diverse domains, spanning gaming, virtual reality, healthcare, and beyond.

Keywords: Gesture Recognition, MediaPipe, Vision-Based Technology, User Interfaces, Human-Computer Interaction, Deep Learning,

PAM-OP-08

A Study of Robotic Process Automation Among Artificial Intelligence

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Abstract: Robotic process automation is a smart way to manage work across those machines which AI can easily categorize. Robot automation is a sequence of steps that give result in a meaningful action without interference of human being. In any organization, robot automation can perform tasks just like a human being. RPA is a program in which sequence of commands are executed as per the predefined rules of organization. When any organization change it's rules then either it needs to hire new employee those can work with new rules or it have to provide training to existing employees to map the requirements of new rules. These both ways are time and money consuming. By the use of robotic automation, the company can place effective workers those can do an impression of human workers.

KEY WORDS: Artificial Intelligence, Robot automation, Interference

PAM-OP-09

Artificial Intelligence Tools to Classify the Images for Medical Image Analysis A-Review

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Abstaract: Artificial intelligence image classification is the study of programming robots to identify and classify photographs according to particular characteristics or patterns. This technology is frequently utilized to automate processes that were previously completed manually by humans in a variety of industries, including healthcare, retail, and entertainment. The way we work with visual data could be completely changed by AI picture categorization, which makes use of cutting-edge algorithms and deep learning approaches. The intricacy and diversity of images themselves are one of the main obstacles to AI image classification. Machine classification of images is challenging because of the wide variations in lighting, angle, resolution, and background that exist in them. The classification procedure might also be made more difficult by the fact that photos may contain several objects or scenarios. To address these issues, scientists are continuously creating new models and algorithms that can handle these variances and raise the categorization accuracy of images. The requirement for big and diverse datasets for machine learning model training presents another difficulty in AI picture classification. Machines require a large number of instances to learn from to identify images effectively. This calls for the time- and resource-intensive collection, labeling, and processing of enormous volumes of data. Furthermore, biases in the data may result in inaccurate classifications, underscoring the significance of rigorous dataset validation and curation in AI picture classification research. In this paper, we discuss different tools used to classify the image.

Keywords: Artificial intelligence (AI), Image classification, Machine learning, Deep learning.

PAM-OP-10

Navigating the Landscape of AI and ML in Healthcare: Opportunities and Challenges

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Abstract: Artificial Intelligence (AI) and Machine Learning (ML) are evolutionary technologies showcasing both the utopian perspective (new opportunities) and the dystopian view (challenges to overcome) in various fields. AI being a technology that encompasses the broader idea of machines simulating human intelligence while ML is a subset of AI focused on algorithms that enable machines to learn from data. In this study we will delve into the solo and collaborative potential of AI and ML in healthcare. We briefly look into the standalone applications of AI and ML, including drug discovery and production analysis, diagnostics, clinical research, personalized medicine, disease prevention, outbreak and monitoring. Some of the notable real-world applications include robotic surgery, electronic health records (EHR), genome sequencing and so on. However, challenges such as data privacy, interpretability, and algorithm bias remain formidable barriers to widespread adoption, then we examine the collective impact of combining AI and ML techniques in healthcare. Amalgamation of these technologies enables more robust predictive models, enhanced decision support systems, and advanced patient monitoring solutions. We wrap off by looking at the developments that will affect AI and ML in healthcare both today and in the future.

Keywords: artificial intelligence, machine learning, healthcare, challenges, applications

PAM-OP-11

Advancements in Artificial Intelligence for Enhanced Medical Diagnosis and Treatment Optimization

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Abstract: The integration of artificial intelligence (AI) into the medical field has significantly advanced diagnostic accuracy and treatment optimization. This paper discusses the utilization of AI-powered diagnostic tools, employing natural language processing and predictive analytics to analyze extensive patient data efficiently. These AI tools aid healthcare professionals in making timely and precise diagnoses, achieving accuracies comparable to human experts. Furthermore, AI algorithms contribute to treatment optimization by evaluating patient data to suggest tailored treatment plans and anticipate medication responses. Methodologies such as deep learning algorithms and machine learning techniques are employed, enhancing the reliability and robustness of AI-driven diagnostic systems. The implementation of AI in medicine reduces treatment times, enhances patient outcomes, and enables early detection of pathological conditions. This proactive approach facilitates personalized healthcare delivery, revolutionizing the healthcare landscape.

Keywords: Artificial intelligence; Medical diagnosis; Natural language processing; Predictive analytics.

PAM-OP-12

RIDESHARE: Women Initiatives For Smart Campus Commuting

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Abstract: The campus transportation of the university is a problem that women face in many cases and that includes car parking jams, many people gathering around on foot, and waiting for buses ranked high on the list. To tackle these problem areas and the fact that most women lack a means of transportation, the woman-focused RIDESHARE carpooling app has been created. The app provides a platform for women students, faculty, and staff to share rides, allowing them to drive together from their residence to the campus and vice-versa. This helps them afford an alternative to driving on their own or using public transportation. Women who are looking for another form of income will have an application that will enable them to carry out rides during set time schedules. With algorithms in place, it comes to traveler and driver fit by distance alongside vehicle type for personalized engagement. The driver initiates the ride by entering their vehicle details like type and number and then waits for the travelers. On the travelers' side, a list of options is available for the traveler to choose from. On selecting their preferred choice, the driver gets the notification and gets to accept or reject the traveler. The ride then starts by moving into the routing section of the application. Finally, the goal is to increase students' awareness of the environment, thus fewer people will drive cars and vehicle traffic/parking demand will be reduced. This is a woman-focused, creative solution that suits the transport system needs of universities which feeds financial consideration and environmental effects. A machine learning algorithm can be integrated to bring the RIDESHARE application as a better commuting option.

Keywords: Carpooling, Commuting, Machine learning

PAM-OP-13

TracXpert: An Intelligent Canteen Traffic Avoiding System

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Abstract: The TracXpert-Canteen Traffic avoiding system represents a pioneering effort to tackle the longstanding issue of congestion and inefficiency in institutional or organizational canteens. This work is motivated by the need to enhance the canteen experience for customers while improving operational efficiency for canteen staff. The key features of this system include pre-ordering capabilities, delivery of customers' ordered meals and convenient pickup times. This work is aimed at reducing waiting time and congestion during peak hours. Additionally, this system utilizes historical data to predict traffic patterns and optimize canteen operations, thereby enhancing overall service quality and customer satisfaction.

This system enables users to browse menus, add items to their cart, pre-order meals, and make payments. Also, the vendors can manage their inventory by adding, deleting, and updating food items. Additionally, an admin login provides oversight and manages the entire system. Overall, the system streamlines canteen operations, reduces congestion, and improves customer satisfaction.

Through rigorous development and testing, this endeavor is to deliver a robust and reliable solution that addresses the multifaceted challenges of canteen management. By implementing the TracXpert system, institutions and organizations can create a more seamless and enjoyable canteen experience for their students, employees, and visitors. An efficient machine learning model can be integrated to bring the TracXpert as a better traffic avoiding solution.

Keywords: Preordering, Food Booking, Congestion, Machine Learning

PAM-OP-14

AI-Driven Diagnosis of Diseases and Recommendations for Treatment

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Abstract: Artificial Intelligence–driven diagnoses of diseases use machine learning algorithms to analyze medical data, encompassing symptoms, patient history, and diagnostic tests. Such algorithms can make sifting through huge amounts of data fast and effective and hence help the doctor make the right diagnosis. Also, AI can assist in treatment suggestion based on the conclusions of established medical guidelines and recent research. AI can recognize relationships not immediately obvious among the symptoms and diseases by use of pattern recognition and data analysis. These relationships are likely to enable early detection of disease and save a life. Further, AI can be used in treatment suggestions that consider the characteristic of the patient to be treated, such as age, gender, gene mutations, and comorbidities. Because of such indications, it enables better treatment plans with fewer side effects and better outcomes. However, AI-driven diagnoses and treatment suggestions in clinical contexts should always be in combination with clinical judgment from healthcare professionals. AI can provide invaluable insights, but human expertise is still needed to interpret the results, to consider patient wishes, and to make the final treatment decisions. AI-driven diagnoses and treatment suggestions may revolutionize healthcare through increased accuracy, efficiency, and personalization in the management of diseases. With ongoing development in AI, there is potential to integrate AI technology into clinical practice to the benefit of patients and healthcare providers.

Keywords:- AI(Artificial Intelligence), Data Analysis, Machine Learning

PAM-OP-15

Cinematic Ai: Revolutionizing Film Production With Ai

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Abstract: This paper introduces Cinematic AI, a revolutionary system that transforms traditional films using superior machine learning algorithms, computer vision solutions, and natural language processing techniques. By benefiting from cutting-edge machine learning algorithms, computer vision techniques, as well as natural language processing; Cinematic AI provides filmmakers with very powerful tools which they can employ in creating films in a completely different manner than what they are used to. The evolution of artificial intelligence has greatly impacted the film industry, introducing innovations like Cinematic AI. This system combines advanced machine learning, computer vision, and natural language processing to revolutionize movie production. It helps filmmakers by automating tasks like generating screenplays, composing scenes, synthesizing actor performances, and editing post-production. Cinematic AI's key features include creating engaging storylines, crafting visually stunning scenes, and even simulating lifelike performances from virtual actors. By speeding up production and offering new creative possibilities, it's changing how movies are made. One of its strengths is its ability to learn from user feedback, making it a collaborative tool for filmmakers of all levels, from independents to big studios. It's adaptable to different genres and styles, making it versatile and promising for the future of filmmaking. In summary, Cinematic AI is reshaping the film industry by blending AI with human creativity, offering new ways to tell stories and create cinematic experiences.

Keywords: Artificial Intelligence, Video Generation, Cinematic Techniques, Deep Learning, Computer Vision

PAM-OP-16

Ai-Driven Messages Automation: Improved Customer Interaction in the Digital Era

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Abstaract: In the rapidly evolving landscape of digital communication, AI-powered message automation has emerged as a transformative tool for businesses seeking to enhance customer engagement and communication efficiency. Utilizing Natural Language Processing (NLP) and machine learning techniques, AI enables the generation of personalized responses to customer inquiries, automated email marketing campaigns, and compelling social media content. Moreover, this research examines the impact of AI-generated messages on maintaining brand consistency, fostering meaningful customer interactions, and optimizing communication workflows. Moral contemplations encompassing AI computerization, for instance, security concerns and human touch in correspondence, are additionally investigated. Furthermore, we address the ethical considerations and challenges associated with AI-generated messaging, including biases, privacy concerns, and maintaining human-like authenticity. Finally, we offer insights into future research directions and potential advancements in this rapidly evolving field, emphasizing the importance of interdisciplinary collaboration and responsible AI deployment.

Keywords: AI-generated messages, Natural Language Processing,(NLP), Security concerns, Biases.

PAM-OP-17

Devin: Revolutionizing AI Tools for Software Engineering

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Abstract: Devin, developed by Cognition Labs, is an advanced AI tool equipped with essential utilities like a shell, code editor, and browser, all within a secure sandboxed environment. Its standout feature lies in its autonomous debugging capability, tirelessly iterating until achieving the desired outcome with unparalleled accuracy and reliability. In comparative assessments, Devin demonstrates superiority over its counterparts, outperforming ChatGPT 3 by 26.65% and ChatGPT 4 by 7.96% in end-to-end problem-solving accuracy, as per the SWE benchmark. While Devin's prowess enhances productivity, it also poses a potential threat to entry-level software engineers, potentially reducing the demand for junior positions and optimizing overall workforce efficiency.

Keywords: Devin, Code editor, SWE, Workforce Efficiency, Sand Box Environment

PAM-OP-18

An Overview on Large Language Model (LLM)

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Abstract: Large language models (LLM) are AI tools specifically trained to process and generate text. These models are trained on large amounts of data so they can provide summaries and translations for large text and answer for questions. The LLMs are also referred to as neural networking systems (NNs), which are computing systems inspired by the human brain. They have recently demonstrated remarkable capabilities in natural language processing task and many more events. LLMs could potentially assist in various areas, given the capability to process complex concepts, as well as respond to diverse requests and questions. The user provides set of keywords, and the LLM generates answers on these topics. They have now become an essential part of computerized language processing having the ability to understand complex verbal patterns and generate coherent and appropriate replies for the situation. Their problem solving capabilities can be applied to fields like healthcare, finance, and entertainment where large language models serve a variety of NLP applications like the chat-bots, AI assistants and so on. This overview on LLMs discusses relevant background concepts along with covering the advanced topics at the frontier of research of LLMs. With the rapid development of techniques and regular breakthroughs in LLMs research, it has become considerably challenging to perceive the bigger picture of the advanced. This article aims to provide an overview on the existing works, the history of LLMs, the architecture of the transformers that are used in them, their advancements, different training methods used.

Keywords: Large Language Models, Neural Networking Systems, AI, Transformers, Natural Language Processing

PAM-OP-19

Analysing Human Facial Emotions and Gender Using Deep Learning

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Abstract: This project deals with computer vision and deep learning to analyze human facial expressions and characteristics. Its primary focus is on analyzing emotions and identifying genders from images. By employing libraries like OpenCV for image processing and DeepFace for sophisticated facial analysis, the system provides comprehensive insights into the emotional state and gender of individuals captured in pictures.The workflow begins with loading an image, often sourced from cloud storage platforms such as Google Drive. Pre-trained deep learning models are then applied to extract pertinent facial features. The results are subsequently displayed, showcasing the predominant emotion and detected gender within the image.Moreover, the project integrates various tools like Matplotlib for visualization, enhancing its capability for detailed analysis and interpretation. Mounting cloud storage services facilitates easy access to a diverse range of image data, ensuring the project's broad applicability and scalability. Beyond its technical implementation, this endeavor carries significant implications across diverse domains. In fields like psychology and human-computer interaction, the automatic recognition of emotions offers valuable insights into user experiences and emotional responses. In marketing and advertising, such technology can inform targeted campaigns by understanding audience reactions to visual content. Additionally, in security and surveillance contexts, real-time emotion and gender analysis can aid in identifying potential threats or anomalies.In essence, this project epitomizes the fusion of AI, image processing, and social sciences, providing a versatile toolkit for deciphering human attributes from digital imagery. Its potential applications span various industries, making it a compelling venture at the intersection of technology and human behavior analysis.

Keywords: Artificial Intelligence, Deep Face, Image processing, Facial feature, Deep Learning, Gender.

PAM-OP-20

Smart Irrigation: Harnessing IOT and Machine Learning for Efficient Plant Care

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Abstract: Technology has advanced to an entirely new level in today's world, enabling people to live simpler and easier lives. With the help of the Internet of Things we can automate or control lots of such devices in out day to day life. An adequate quantity of watering for plants is important for maintenance of gardens. It is beneficial for roof farming and gardening. The proposed system leverages IoT sensors to gather real-time data on soil moisture levels, weather conditions, and plant health indicators. To begin with, the sensor constantly detects the moisture level in plants. As soon as the moisture level drops, it provides an adequate quantity of water. This system is very easy to set up and can be controlled using a smartphone or computer. This data is then analyzed using ML algorithms to predict optimal watering schedules tailored to the specific needs of the plants. This system is perfect for small plants or plants that do not need a lot of water. By dynamically adjusting watering patterns based on environmental factors and plant requirements, the system aims to minimize water consumption while maximizing plant growth and health.

Keywords: Internet of Things, machine learning algorithms, sensors, gardening and roof farming.

PAM-OP-21

Wildlife Detection Using Deep Neural Networks with Python

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Abstract: Deep learning, a subset of machine learning, focuses on uncovering intricate distributed representations across multiple levels. Recent advancements in deep learning have revolutionized traditional artificial intelligence tasks. This project endeavours to construct an advanced deep learning model cantered on computer vision. It surveys recent research in deep learning, highlighting pivotal contributions and addressing associated challenges. Emphasis is placed on integrating insights from various studies and notable researchers to inform the model's development. The document outlines system requirements, delineating the computational demands essential for creating such models. Given the resource-intensive nature of deep learning, understanding the requisite computational power is crucial. An overview of the system is provided, offering insights into its architecture and design through visual aids for enhanced comprehension. The discussion concludes by outlining future plans for refining and enhancing the deep learning model to achieve superior performance compared to the current iteration.

Keywords: Artificial Intelligence, Computer vision, Power heavy, Convolution Neural Networks, Class weights, Model Layers.

PAM-OP-22

Data Science in Agriculture and Farming

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Abstract: The world has already transformed due to data analytics, which has also introduced several fresh concepts for better decision-making, trend analysis, and opportunity identification. Agriculture is a huge sector all over the globe with food demand growing day by day. The current state of employing traditional approaches in practically all sectors is being revolutionised and altered by machine learning, the internet of things, artificial intelligence and big data. Although about 42% of India's labour force is employed in agriculture, the sector only makes for 14% of the country's GDP. Considerable investigation has been conducted into the use of data analytics in agriculture. The integration of these technologies is not without its difficulties, though. First off, not many farmers are aware of these technologies. Secondly, there is a wide range of data regarding production and harvest, weather patterns, illness, insect damage, and other topics. Data science for agriculture with precision farming and remote sensing equipment.

Key Words: -Artificial Intelligence, Machine learning, Data Analytics, Precision Agriculture, Remote Sensing

PAM-OP-23

Crafting Custom Recommendations for Instant Premix Food using recommendation systems

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Abstract: The burgeoning market for instant premix food products presents a unique opportunity to leverage recommendation systems for personalized marketing. In this dynamic landscape, MTR Foods, one of the leading premix food producers in India, can harness the power of customer data to personalize the shopping experience and drive customer satisfaction. Traditional marketing methods may not capture the nuances of individual preferences, but a well-designed recommendation system can bridge this gap. By analysing past purchases and user interactions, these systems can predict which instant premixes are most likely to resonate with each customer. This translates to increased sales for MTR Foods as customers discover hidden gems within their product range and make repeat purchases based on these personalized suggestions. Collaborative filtering, a specific technique within recommendation systems, goes beyond simply recommending popular products. It identifies customers with similar tastes and recommends products those similar customers have enjoyed. Applied to the instant premix market, this approach fosters a sense of discovery, encouraging exploration of new culinary options that may not have been on a customer's radar initially. To build such a system for MTR Foods, a structured questionnaire gathering both qualitative and quantitative data from a diverse sample of their consumers is crucial. This data acts as the fuel for machine learning powered recommendation system. By considering individual preferences, dietary restrictions, and past purchase history, the system can deliver an unparalleled level of personalization. This approach not only benefits MTR Foods by optimizing the consumer experience for their instant premix products, but it also contributes valuable insights to the field of recommendation systems. The study offers a novel perspective on how collaborative filtering can be applied within the instant premix market, demonstrating the effectiveness of combining structured questionnaires with algorithmic approaches to generate targeted recommendations.

Keywords: Collaborative filtering, recommendation systems, instant premix foods, personalization, algorithmic approach.

PAM-OP-24

Advancements in Biomedical Computing: Evolution, Impact, and Future Directions

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Abstract: The integration of computers into biology and medicine has profoundly influenced healthcare delivery and research methodologies. This paper explores the historical development and contemporary impact of biomedical computing, highlighting its pivotal role in accelerating research, enhancing diagnostic capabilities, and facilitating treatment optimization. The paper discusses the current state-of-the-art in biomedical computing, emphasizing the utilization of high-performance computers and advanced capabilities that have propelled significant progress in the field. It develops into various computational visualization methods employed in biomedical research and clinical applications, including 2-D and 3-D techniques such as multiplanar sectioning, surface renderings, and volume renderings. The paper also highlights recent breakthroughs in biomedical computing technology, particularly the integration of artificial intelligence technology, which has revolutionized the field. AI-driven advancements have exceeded expectations, offering unprecedented opportunities for personalized medicine, predictive analytics, and enhanced patient care.

Keywords: Biomedical Computing; Treatment Optimization; Predictive Analytics; Contemporary Impact.

PAM-OP-25

From Algorithms to Al: Emerging Trends in Programming Languages

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Abstract: The rapid advancements in technology have propelled programming languages from mere tools for algorithmic implementation to indispensable frameworks for developing artificial intelligence systems. This paper explores the evolving landscape of programming languages, tracing the trajectory from traditional algorithmic paradigms to the forefront of Al development. It examines emerging trends such as machine learning, deep learning, and natural languages, tracing the trajectory from traditional algorithmic paradigms to the forefront of Al development. Furthermore, it delves into the challenges and opportunities presented by these trends, Including the need for specialized languages, enhanced libraries, and scalable infrastructures. Through this analysis, we gain insights into the future direction of programming languages as they continue to shape and enable the next generation of Al-driven innovations.

Keywords: Algorithm, Typescript, Kotlin, AI, Machine Learning

PBM-OP-01

Analysis of Different Robotics Technologies, Controllers and Applications

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Abstract: 21st century is an era of rapid technology development that had seen tremendous advancements and new emerging technologies in telecommunication, mobile technology, robotics, IC technology and space explorations. Robotics technology is evolved as a more prominent among these and often twinned with Artificial Intelligence and Process Automation. The Robotics Process Automation (RPA) became emerged as one of the top most advanced technology in software industry and there is a huge demand for RPA professionals in IT sector. Mobile Robots fuelled up the era of start-up companies developing service Robots as waiters in restaurants, for monitoring patients in hospitals during Covid pandemic and even cooking Robots are evolved. Robotics even intruded to our day to day as amazon alexa replying to our queries, playing music and stories for us, switching lights and as automatic machine sweeper and as automatic car and toys for child to play with. Humanoid, industrial, surveillance robots and drones became an integral part in medical, agricultural, industrial, security, commercial, consumer, defence and military fields to replace the humans, to ease their repetitive works with at most accuracy and as a source of entertainment.

Keywords: Robotics, Artificial Intelligence, Robotics Process Automation

PBM-OP-02

Advancements in Neural Prosthetics: Bridging The Gap Between Mind and Machine.

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Abstract: The goal of neural prosthetics is to restore lost functions in people with neurological disabilities by fusing neuroscience and technology in a revolutionary way. Through invasive or non-invasive techniques, these prosthetics communicate with the neurological impulses of the brain. Neural interfaces (such electrode arrays or sensors), signal processing algorithms, and actuators (like robotic limbs or sensory feedback systems) are important parts. In order to decode and interpret brain signals in real-time and facilitate smooth communication between the prosthetic device and the user's nervous system, artificial intelligence (AI), in particular machine learning and deep learning, must be included. This abstract also highlights AI's critical role in advancing brain prosthetics by giving a summary of current developments and problems in the field.

Keywords: Prosthetics, Neural, gap, AI

PCB-OP-01

Application of Mathematics In Cybersecurity

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Abstract: The increasing complexity of technology presents a crucial challenge in cybersecurity, necessitating the use of mathematics to safeguard data and prevent reputational damage. The science-based approach utilizes real-world data to validate predictions, enhancing our comprehension of intricate systems and their practical cybersecurity applications. Quantitative analysis is crucial in evaluating computational complexity and identifying trends in encryption algorithms, thereby enhancing resource utilization and ensuring the protection of sensitive information in cybersecurity. Mathematics plays a crucial role in cyber security, encrypting data, detecting anomalies, and securing networks, ensuring resilience against evolving threats in the cyber world. Here we will be mainly focusing on information theory, also known as mathematical communication theory, which is crucial in cybersecurity. It examines concepts like entropy and information complexity in cryptography to determine the strength of protocols and encryption systems. Claude Shannon and Warren Weaver's 1940 theory, based on sender and receiver, focuses on data transmission, processing, and measurement. In mathematics and computer science, an algorithm is a calculable pattern of clear, computer-implementable directions. They are used to solve problems or to complete computations. Further investigations of ours are directed towards finding ends and means in order to enable successful strategy implementation, including new cycle of planning, coordination and control of the action plan fulfilling, including georeferenced data.

Keywords: Cyber-security, mathematics, securing networks, encrypting data, cyber-attacks.

PCB-OP-02

Cyber Security Education and Awareness

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Abstract: In today's digital landscape, safeguarding information is paramount across sectors, from individuals to governments. This study underscores the critical need for robust cybersecurity measures to counter unauthorized access, data breaches, and cyber threats. It aims to evaluate cybersecurity effectiveness by assessing awareness levels, analyzing the impact of digital transformation, identifying vulnerability factors, assessing AI solutions, and proposing strategies to enhance resilience against cyber-attacks. Employing a qualitative research approach, including literature review, case studies, and expert interviews, the study delves into cybersecurity trends, challenges, and opportunities. Key findings emphasize the escalating complexity of cybersecurity challenges due to digital transformation, highlighting the pivotal role of proactive measures and AI solutions in threat mitigation. Additionally, the significance of security awareness training in empowering employees to address cyber risks is underscored. Recommendations advocate for educational initiatives, technological investments, and collaborative efforts to fortify organizational cybersecurity posture.

Keywords: Cybersecurity; Digital transformation; Resilience; Threat mitigation.

PCB-OP-03

Cyber Security Application using AI and Block Chain Technology

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Abstract: Cyber security is the protection of computer system and networks from attacks by malicious actors that may result in unauthorized information disclosure, theft of, or damage. This is an overview of that explores the scope of cyber security with artificial intelligence and blockchain technology. With the exponential growth of digital threats, traditional security measures are proving insufficient. These applications represent innovative solutions that go beyond traditional methods, offering enhanced capabilities for defending against cyberattacks and securing digital assets. This paper examines the symbiotic relationship between AI and blockchain, elucidating how AI enhances threat detection and response, while blockchain technology reinforces the trustworthiness of data by ensuring its accuracy and preventing unauthorized modifications. Furthermore, it surveys promising applications such as AI driven threat intelligence and decentralized identity management. By fusing these technologies, organization can forge resilient cybersecurity framework capable of adapting to the ever-evolving digital landscape.

Keywords: Cybersecurity, Block Chain Technology, Threats, Hindrance, Artificial technology.

PCB-OP-04

Improving DES Performance in Medical Image Encryption with ACO Integration

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Abstract: In today's interconnected world, vast amounts of sensitive data are stored and transmitted online. By safeguarding against unauthorized access to personal information, cybersecurity measures help preserve individual privacy rights and prevent invasive surveillance or data exploitation. Image encryption is a method of securing image data to prevent unauthorized access or viewing. Data Encryption Standard (DES) has been a popular algorithm for image encryption due to its low memory consumption and good performance, but it suffers from long computation time and image loss problems after decryption. This paper explores integration of the Ant Colony Optimization (ACO) technique of DES to improve its performance in medical image encryption. The performance of the improved and existing DES was measured in terms of memory usage, computation time, output bytes, and mean squared error (MSE) and peak signal-to-noise ratio (PSNR) to assess differences and draw conclusions. The results showed that the improved DES performed better than the existing DES.

Keywords: Cybersecurity, Data Encryption Standard (DES), Medical image encryption, Ant Colony Optimization (ACO), Performance Improvement

PCB-OP-05

Exploring AWS S3: In-Depth Analysis of Bucket Management

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Abstract: The abstract delineates Amazon Simple Storage Service (S3) as a cornerstone in modern data management strategies within cloud computing, particularly within Amazon Web Services (AWS). It accentuates S3's pivotal role in providing scalable, durable, and accessible object storage infrastructure. The scalability of S3 emerges as a key advantage, enabling seamless expansion of storage capacity without upfront investments or provisioning delays. This flexibility empowers organizations to accommodate dynamic data growth while maintaining operational agility, a crucial aspect in today's rapidly evolving digital landscape. Furthermore, the abstract underscores S3's exceptional durability, boasting an impressive 99.999999999% reliability. This reliability ensures steadfast data integrity and resilience against potential failures, mitigating concerns about data loss and bolstering confidence in managing mission-critical information effectively. Accessibility is highlighted as another crucial aspect of S3's significance, with robust access controls and APIs facilitating secure data retrieval, storage, and management from any location. This accessibility fosters collaboration and innovation by enabling seamless data interaction and utilization across geographical boundaries. The integration capabilities of S3 with other AWS services are portrayed as instrumental in enhancing operational efficiency and optimizing data analytics workflows. S3 serves as a foundational element in data analytics endeavours, facilitating data ingestion, storage, and processing to derive actionable insights from diverse datasets. Moreover, the abstract emphasizes S3's versatility beyond storage, supporting various applications such as content delivery, backup and archiving, disaster recovery, and machine learning model training. This versatility not only drives innovation across industries but also underscores S3's role in driving digital transformation and fostering a culture rooted in data-driven decision-making. In conclusion, the abstract stresses the profound significance of Amazon S3 in contemporary data management, transcending mere storage infrastructure. Its unparalleled scalability, durability, and accessibility make it indispensable for organizations navigating the data-centric landscape of modern business environments, underlining the imperative of harnessing its full potential for organizational success.

Keywords-Amazon Simple Storage Service (S3), Scalability, Durability, Accessibility, Integration capabilities, Data-driven decision-making

PCB-OP-06

Safeguarding Cyber and Block Chain Security

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Abstract: Cybersecurity Challenges in understanding the evolving threat landscape and the importance of proactive measures in securing digital assets. Explore the potential vulnerabilities in traditional security approaches and the need for innovative solutions. Block chain Security gives a solutions unleashing the power of block chain to enhance security and transparency. Exploring the potential of decentralized systems and cryptographic techniques in fortifying digital transactions and data integrity. Safeguarding the Future is more important to empowering organization with the knowledge and tools to fortify the future of cyber and block chain security. Embrace the potential of innovation and collaboration in creating a secure digital ecosystem. Embrace the innovation and creativity in fortifying cyber and block chain security. Let's explore the cutting-edge technologies and strategies to safeguard our digital future.

Keywords: Cybersecurity, landscape, cryptographic techniques, cutting-edge, fortifying, empowering

PMA-OP-01

Mathematical Modelling in Interpreting Reaction Pattern in Heat Waves

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Abstract: Mathematical modelling is an approach for representing and studying real-life problems and phenomena using mathematical equations, predictions, and solutions. The aim of mathematical modelling is to comprehend and find possible ways to overcome the given scenarios or circumstances. The survey being conducted demonstrates the reaction patterns of heat waves in human beings using a dynamic system model. These statistics can be used by various domains such as health care, commerce, agriculture, etc., which can be used to conquer social-economic disruption, psychological stress, healthcare system strain, and so on. The objective of this survey is to investigate the impact of heat stroke on individuals across different demographics, including locality, occupation, age, and gender. The prevailing data depicts the heatstroke occurring due to high temperatures and more heat waves, and it also covers the theory of mathematical modelling and its applications. With the continuous advancement and evolution of mathematical theories, techniques, and applications and improvements in living standards, we can tackle challenges efficiently. Through mathematical models, algorithms, and equations, solutions to complex real-world challenges can be derived with precision and efficiency.

Keywords: Mathematical modelling, dynamic system model, solutions, heatstroke, reaction pattern.

PMA-OP-02

Mathematics in Cryptography

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Abstract: This article provides an overview of various cryptography algorithms and the areas of mathematics behind them. By providing an overview of the mathematical concepts, this article also aims to equip the readers with the foundational knowledge required to understand the application of mathematics in the current day cryptography. Cryptography is the study and practice of sending secured and encrypted messages between two or more parties. It uses encryption to encode and decode data. It is associated with the process of converting unintelligible text and vice versa. Cryptography relies heavily on mathematics to ensure the confidentiality and integrity of data. One fundamental math concept supporting cryptography is modular arithmetic, which deals with the concept of remainders when dividing numbers. Another mathematical concept supporting cryptography is prime numbers. These prime numbers play a crucial role in generating secure keys. Mathematics also plays a role in cryptographic hash functions. These hash functions are used for integrity check and digital signatures. In conclusion, mathematics provides a strong foundation to the functioning of cryptography using various mathematical concepts such as modular arithmetic, prime numbers, probability, linear algebra, number theory. Through the foundation of these mathematical tools, cryptography ensures us to transmit messages and information safely without interrupting the privacy of the user.

KEYWORDS: Cryptography, Mathematical concepts, Encryption, Modular arithmetic, Prime numbers, Security

POT-OP-01

Maximizing Efficiency and Cost Savings with DevOps: Strategies and Metrics

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Abstract: This paper presents the transformative impact of DevOps methodologies in driving cost savings through streamlined processes, optimized resource utilization, and improved collaboration. It outlines methodologies for measuring DevOps initiatives' impact, including before-and-after comparisons and benchmarking against industry standards. Furthermore, the paper explores key metrics like Lead Time, Cycle Time, Deployment Frequency, and Release Velocity in the DevOps context. Additionally, it proposes a simulation formula to model the DevOps process, enabling organizations to analyze the impact of parameters on lead time and overall system performance. By integrating simulation techniques, organizations can uncover process optimization strategies and cost-saving opportunities. This paper serves as a comprehensive guide for organizations aiming to leverage DevOps to accelerate delivery speed, minimize errors, and achieve significant cost savings in software development and deployment.

Keywords: DevOps; System Performance; Deployment Frequency; Release Velocity.

POT-OP-02

Spam Identification in Cloud Computing Based on Text Filtering System

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Abstract: The rise of cloud computing has radicalized the way we store, share, and access information It has introduced new challenges like the surge of spam content. In cloud computing, the textual data has expanded and has increased the risk of spam infiltrating in cloud-based systems. To address the above challenge, we propose a stable text filtering system for identifying spam in cloud computing environments. This system takes advantage of machine learning techniques to analyse and classify text data as either spam or justifiable content. The major part of this system includes data collection, pre-processing, feature extraction, machine learning model training, integration with cloud infrastructure, and continuous monitoring with a feedback loop for flexible learning. By effectively detect the spam, this system heighten the security, reliability, and efficiency of cloud-based services, ensuring a safer and more ideal user experience.

Keywords: Cloud Computing, Textual data, Spam Content, Infiltrating, Text Filtering System, Cloud Infrastructure

POT-OP-03

Navigating Cloud Computing: Opportunities and Risks in Adoption and Implementation

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Abstract: Cloud computing represents a monumental shift in the landscape of IT services, offering a comprehensive suite of resources including servers, storage, databases, software, analytics, and more, all accessible through the internet. As the adoption of cloud technologies continues to soar, professionals across industries are increasingly vigilant about the associated risks and challenges. This study goes beyond surface-level analysis, providing a deep dive into the process of identifying, evaluating, and prioritising these risks for organisations embracing cloud services.

In contrast to the intricate and resource-intensive management required by traditional on-premises data centers, which involve tasks such as virtualisation, software installation, hardware provisioning, and ongoing maintenance, cloud computing presents a more streamlined and efficient solution. Cloud vendors assume the responsibility of hardware upkeep and offer a wide array of services on a flexible pay-as-you-go model. This empowers businesses with scalability and cost-effectiveness, making cloud computing a game-changer in the modern IT landscape.

Keywords: Cloud Computing, IT Services, Servers, Software Adoption., Virtualization, Cloud Vendors

POT-OP-04

Decoding the Cloud: Investigating its Architecture and Applications

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Abstract: Cloud computing is a key technological development in the information technology industry. It is one of the best techniques for managing and allocating a lot of information and resources across the entire internet. Technically speaking, cloud computing refers to accessing IT infrastructure through a computer network without having to install anything on your personal computer. Businesses can modify their resource levels to match their operational needs by utilizing cloud computing. Organizations and corporations can cut infrastructural costs with the use of cloud computing. Organizations can test their applications more quickly, with better management, and with less upkeep. The IT team can adapt resources to changing and erratic requirements thanks to cloud computing. There is proof that cloud computing has a role in everyday life thanks to various applications in various contexts. This essay will cover every aspect of cloud computing, including its architecture, traits, types, service models, advantages, and challenges.

Keywords— Cloud computing, Architecture, characteristics, Types, Service model, Benefits and Challenges.

POT-OP-05

Beyond boundaries: Quantum Computing's impact on COVID-19 healthcare evolution

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Abstract: During stiff situations like covid19 pandemic, the use of quantum computing has helped researchers in resource management and drug development due to its speed and accuracy. Quantum computing differs from classical computing, as it uses quantum bits or qubits to represent the basic unit of information. A qubit can be existed in both 0 and 1 simultaneously which contributes to quicker response time and accuracy for solving critical problems. Quantum optimization algorithms can effectively manage the allocation of hospital resources, and vaccinations and maintain the privacy of patient data which was very much essential during those tough days. Quantum computing provides insights into the innovative ideas for the latent applications of quantum computing for pharma, hospital, and health insurance representatives including patients to have practical and absolute solutions. Quantum computers can simulate molecular interactions achieve more in detail than the classical computer does. It improves the accuracy and speed of epidemiological modeling, for researchers to better understand the spread of infectious diseases like COVID-19. By analyzing complex data sets and simulating different scenarios, quantum computing can help policymakers make much more informed decisions about public health care and resource allocation. It can strengthen data encryption Additionally, the heightened computational power of quantum computers strengthens data encryption and cybersecurity measures This paper tries to analyze how quantum computers revolutionize drug discovery and development by simulating molecular interactions with accuracy and speed during covid-19.

Keywords: Quantum Computing, covid19 pandemic, healthcare system, quantum optimization algorithms, quantum bits.

POT-OP-06

Insights from Pixels : CNNs Unveiling Agricultural Quality Secrets

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Abstract: The agricultural sector constantly faces a challenge of meeting the escalating consumer demands for high-quality produce while maximizing yield for farmers. The traditional methods such as visual inspection or labor-intensive lab tests for quality assessment result in reduced scalability and efficiency. In this presentation, we explore the remarkable potential of Convolutional Neural Networks (CNNs) in optimizing agricultural quality assessment. We begin by highlighting the critical importance of ensuring high-quality agricultural produce and the challenges faced in traditional assessment methods. Followed by an overview of CNNs and their ability to learn intricate features from complex data, making them suitable for analyzing hyperspectral images. Hyperspectral imaging is a powerful technique for capturing detailed information about the chemical composition and physiological status of agricultural products. We illustrate how the trained CNN can predict the quality of agricultural produce from hyperspectral images, enabling real-time assessment and optimization of harvesting, storage, and distribution processes and also its integration with agricultural practices. We conclude with examples of successful implementations of CNN in agriculture and also discuss its benefits and potential future in revolutionizing agricultural practices and ultimately contributing to food security and sustainability on a global scale.

Keywords: CNN(Convolution Neural Network), Hyperspectral.

POT-OP-07

Evolution of Galaxies Using CCDs and HRDs

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Abstract: Using data from the recent surveys such as Sloan Digital Sky Survey (SDSS), Galaxy Evolution Explorer (GALEX), Wide-field Infrared Survey Explorer (WISE), and Infrared Astronomical Satellite (IRAS), we have attempted to study the classification and evolution of galaxies within galaxy clusters. While the traditional Hertzsprung-Russel diagram (HRD) has long been a fundamental tool to understand the stellar histories, and evolution of a star cluster, its application to the study of galaxy evolution has been limited in literature. In this work, an attempt has been made to introduce a novel technique of combining both HRDs and color-color diagrams (CCDs) to deeply study a set of about 15 galaxy clusters. Within each galaxy cluster, a minimum of 300 galaxies are selected based on the availability of clean data for thorough analysis. To trace the sequence and trend of galaxy evolution, we have over plotted the magnitudes of a set of about 25,000 different types of galaxies which are spectroscopically classified by SDSS as spirals, elliptical, and active galaxies. To confirm the classification, color-color diagrams and color-magnitude diagrams are also plotted using optical, ultraviolet, and infrared bands. The results revealed distinctive patterns, such as active galaxies exhibiting (g−r) colors greater than −0.2, while the graph of (FUV−NUV) versus (NUV−r) colors effectively differentiated between young spiral galaxies, starbursts, and active galaxies. The position and distribution of stars along the isochrones in the HR diagram, gives an idea about the age of the cluster. Progressive variation in the isochrones explains the evolution of constituent stars (here, galaxies) and thus the evolution of the cluster. By constructing isochrones using interpolation method, unique trends specific to each galaxy cluster is observed providing insights into their evolutionary paths. This technique is novel as it uses magnitudes of galaxies in multiwavelength bands to populate HRDs and CCDs simultaneously.

Keywords: Galaxy clusters, H R Diagrams, Color-color diagrams, Morphology, Evolution, Redshift

POT-OP-08

Automated Real Time Helmet Detection Using Computer Vision and Deep Learning

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Abstract: In the contemporary landscape, two wheelers have emerged as the predominant Mode of transportation, despite their inherent risk due to limited protection. Disturbing data has been observed that, according to Bengaluru traffic 70% of the vehicles involved in the accidents were two wheelers, and also more than 70 per cent of the users do not wear safety helmets for various reasons. Recognizing the crucial role of helmets, government has made riding without one a punishable offense, as for the traffic police to monitor each and every cyclist who violate the rule has become difficult. In today's world of advancing technology, we can leverage the power of computer vision and deep learning to tackle this problem. This can eliminate the need for constant human surveillance to be kept on riders and can automate this process. Our proposed solution utilizes video surveillance and the YOLOv8 deep learning model for automatic helmet detection. The system ensures pure machine learning to identify helmet types with minimal computation cost by utilizing various image processing algorithms. Once the helmet-less person is detected, the number plate corresponding to the rider's motorcycle is also detected and extracted using computer vision techniques. This number plate is then stored in a database thus allowing further intervention to be done by the authorities to ensure penalties. The model development achieves an overall accuracy score of 93% on the testing data, thus showcasing good results on diverse datasets. The proposed CNN algorithm model strives to achieve the confidence rate 99% and 0.1% of error rate hence increasing the validation of model.

Keywords: YOLOv8, deep learning model, object detection, image processing algorithms.

POT-OP-09

Recognizing Abnormal Behavior in Heterogeneous Crowd using Transfer Learning

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Abstract - Deep learning approaches are currently being employed to transform traditional human behavior recognition in video surveillance into intelligent techniques. To adopt safety measures in public gatherings, this paradigm shift offers numerous sophisticated features. Proactive surveillance, identification, and supervision of diverse crowd gatherings can improve many crowd-management related operations in terms of usefulness, capacity, predictability, and safety. Convolutional neural networks, in spite of a number of issues such occlusion, clutter, uneven item distribution, and non-uniform object scale, are a promising method for recognizing human actions in huge data, such as CCTV. Hence, this study aims to propose a CNN based Abnormal Classifier model for identifying the abnormal behavior of humans in public gatherings such as Airport, Malls, Theatres etc, The proposed Model has the ability to classify and obtain the final behavior classification results. The experimental depicts that proposed method is marginally outperforms the existing methods.

Keywords*;* Deep learning, heterogeneous crowd, video surveillance, abnormal behavior, convolutional neural networks, classifier

POT-OP-10

Role Of Mathematics in Data Science and Artificial Intelligence

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Abstract: Mathematics is a crucial discipline in data science, focusing on structure, order, and relation. It is essential for machine learning algorithms, analysis, and drawing conclusions from data. Mathematics supports problem-solving, model performance optimization, and interpreting complex data to address business queries. Artificial intelligence (AI) has revolutionized various aspects of life, with its foundation in mathematics comprising branches like algebra, geometry, trigonometry, calculus, statistics, and probability. This explores the relevance and use of mathematics in AI, highlighting its role in large-scale data processing and interpretation. Machine algorithms require an understanding of concepts from statistics and linear algebra. These algorithms recognize patterns, forecast outcomes, and categorize data using mathematical equations and functions. It is essential for analyzing data, requiring a specific type of mathematical reasoning beyond basic concepts like calculus, discrete mathematics, and linear algebra. Understanding statistical and probability theory ideas is crucial for applying algorithms in data science. Modern data science methods, including machine learning, have a strong mathematical basis for their techniques, making it a vital part of modern scientific fields. Mathematics plays a foundational role in both artificial intelligence (AI) and data science thus providing the theoretical framework and tools necessary to analyse and make predictions from data. In this paper, we'll explore the essential mathematical concepts underpinning AI and data science.

Keywords: Mathematics, Artificial Intelligence (AI), Data Science, Machine Algorithms, Statistical Theory

PAM-OP-26

A Comprehensive Approach On Deepfake Video Detection Adapting CNN and RCNN

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Abstract: Deepfake videos, fueled by advancements in artificial intelligence and machine learning, pose significant challenges to the authenticity of digital content. Detecting these manipulated videos requires sophisticated techniques that can analyze both spatial and temporal features. In this paper, we propose a comprehensive approach for deepfake video detection leveraging Convolutional Neural Networks (CNNs) for spatial analysis and Recurrent Convolutional Neural Networks (RCNNs) for temporal analysis. By analyzing the consistency and evolution of visual cues over time, the RCNN effectively discerns between genuine and manipulated video content. The model's performance is evaluated on a separate test dataset, with metrics such as accuracy, precision, recall, and F1-score used to quantify its effectiveness in detecting deepfake videos. Experimental results demonstrate the efficacy of the proposed approach in accurately identifying deepfake content across a range of scenarios.

Keywords: ResNet, RCNN, CNN, Deepfake videos.

PAM-OP-27

Autonomous Traffic Enforcement and Management system Machine Learning & Deep Learning driven traffic management for cities and highways

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Managing burgeoning traffic today in Indian cities, it is indeed a gargantuan task for traffic police. With increasing vehicular population, enforcement is of utmost importance to increase road safety, and to save lives considering 4.61 lakhs accidents reported in 2022 in India as per data from MORTH. Using AI to regulate road traffic, increase automated smart enforcement and educate road safety to users is the need of the hour.

Thanks to AI, this has been made simpler, easier and efficient with autonomous functioning with the use of computer vision technology. Using Machine & Deep learning neural compute platform with Yolo on Tensor, this has been achieved to track traffic offence in real time as it happens on the roads. Over-speeding detection at even 180kms/hour, lane change detection, one-way driving detection, no-helmet driving detection on 2-wheelers, triple riding detection, vehicle density analysis with counting, vehicle type classification integrated with direction tracking, and combining all these into predictive modelling for traffic management in the city ensures complete automation and autonomy without human interference. The IoT integration helps traffic signals automate its functioning with this input for smoother traffic flows. The integrated Android & iOS apps for commuters gets real time updates on traffic density, rod diversions to avoid traffic jams to commute in the city easily.

This platform is integrated with eChallan system to generate automated traffic violation challans on SMS gateway with links to their traffic violation evidence snippet. This increases traffic safety awareness and thereby decreases road accidents and loss of lives. This gives traffic police key insights into traffic management modelling on the fly to reduce and eliminate traffic jams in the city with key parameters from the predictive modelling platform.

Keywords: Intelligent Traffic Management System, Automated Traffic Enforcement System, Machine Learning, Yolo, Tensor, OCR, Deep Learning, Python, Data Analytics, Video Analytics.

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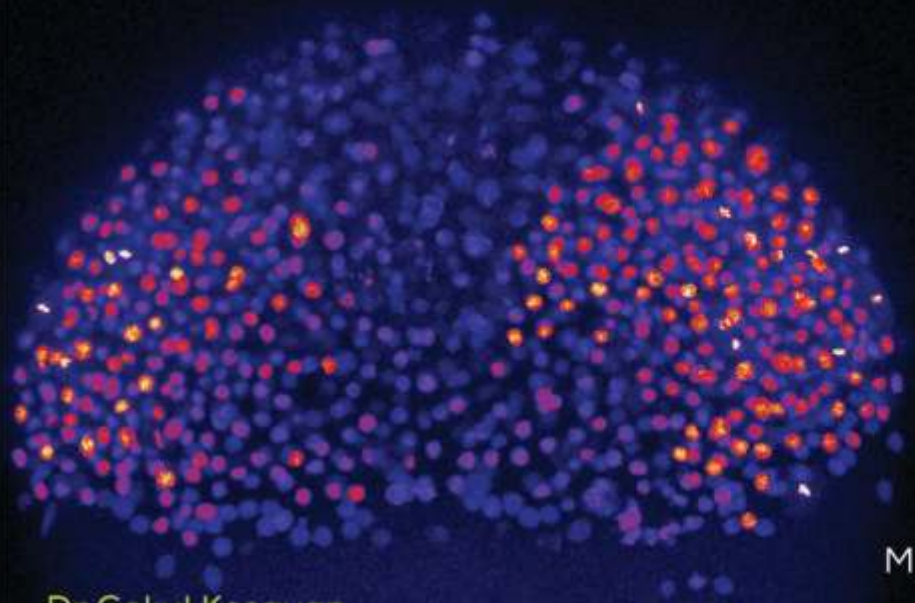

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