



**YBN UNIVERSITY RANCHI**

***SCHOOL OF SCIENCE***

***QUATERLY NEWSLETTER***

**VISIONA**

**EXPLORING KNOWLEDGE • CELEBRATING  
CURIOSITY • INSPIRING INNOVATION**

**June-September 2025  
Volume- I, Issue-I  
Bilingual**



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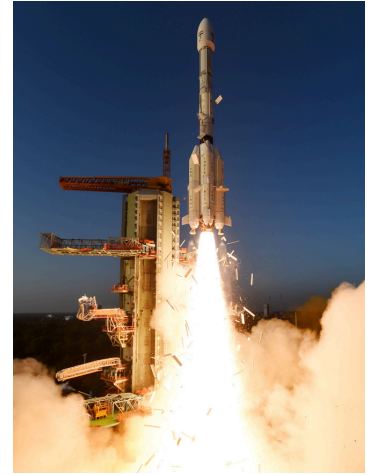
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# FROM THE EDITORIAL DESK







# Y B N UNIVERSITY

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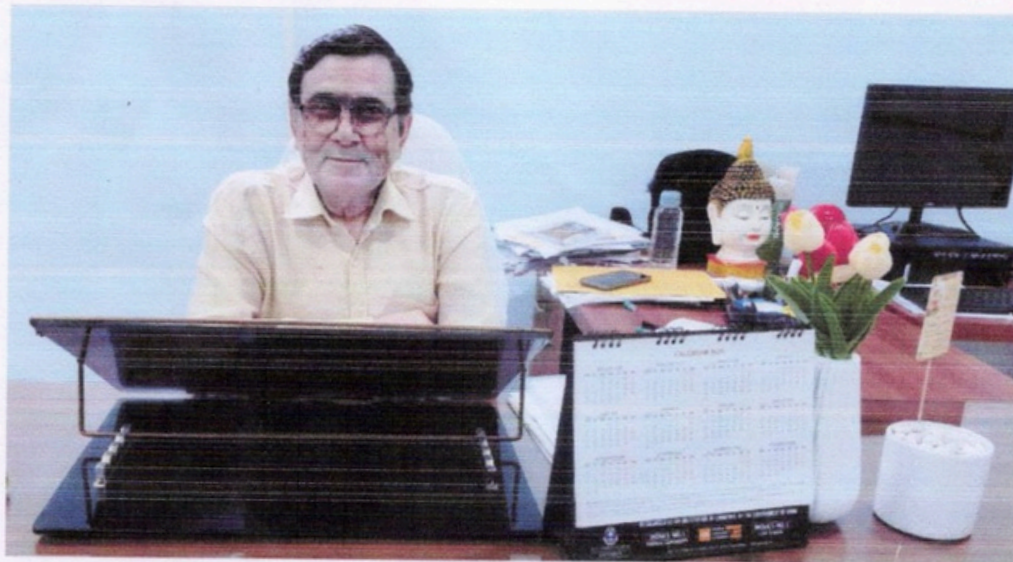
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## Message from Hon'ble Vice-Chancellor



### VISIONA: A Milestone in Scientific Communication and Societal Impact

It is with immense pride that I congratulate the School of Science, all staff, and external experts on the launch of VISIONA: Volume I, Issue I.

This E-Newsletter is a testament to your collaborative efforts and deep commitment to scientific communication. VISIONA brilliantly captures the essence of "Science for Nature and Society" by presenting complex concepts in a popular and lucid style. We live in an era where the seamless integration of Science, Technology, Engineering, and Management (STEM) is vital for global progress. Our role as a university is to not only generate knowledge but to translate it into actionable insights for the community.

I urge our brilliant minds to focus their research on solving real-world societal and environmental challenges. Let this newsletter serve as a powerful platform to share innovative ideas and impactful discoveries with a wider audience. May VISIONA inspire students and readers alike to appreciate the profound beauty and practical application of science. Remember, the ultimate purpose of all academic endeavour is to uplift society and foster a sustainable future.

I wish the entire team continued success in this important mission of public science engagement.



*Satyadeo Poddar* 26.9.2025  
Prof. Satyadeo Poddar, Vice-Chancellor  
Y.B.N. University, Ranchi, Jharkhand  
Vice-Chancellor  
YBN University-Ranchi



# DR. MADHUMANTI

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Dear Readers,

It fills my heart with joy to welcome you to the latest edition of the Quarterly E-Newsletter **"VISIONA"** of the School of Science, YBN University. This magazine is a celebration of curiosity, creativity, and the boundless spirit of exploration that science inspires in all of us.

Science is not only about experiments and theories—it is about asking questions, seeking answers, and looking at the world with wonder. Every contribution in this E-Newsletter—be it an article, a photograph, a poem, or a piece of news—reflects the passion and enthusiasm of our vibrant academic family. Together, these voices remind us that learning is a lifelong journey, and knowledge grows when shared.

I am deeply grateful to all our faculty, students, and contributors who have poured their thoughts and talents into making this edition meaningful. Your efforts and imagination are the true strength of this E-newsletter.

As we turn these pages, may we feel inspired to think bigger, dream higher, and explore further. Let this magazine be a gentle reminder that science is not just in textbooks—it lives in our ideas, our questions, and our everyday experiences.

With best Wishes

Editor  
in  
Chief  
.....



# DR. ASHA MISHRA

## Dean, School of Science

Email-deanss@ybnu.ac.in

## Associate Editor in Chief

Dear Science Enthusiast,

It gives me immense pleasure to extend my warm greetings on the occasion of the publication of **Visiona**, the E-newsletter dedicated to nurturing curiosity, creativity, and innovation in the field of science.

Science has always been a beacon of progress, shaping our understanding of the world and empowering humanity with solutions to its challenges. Through this E-newsletter, we aim to provide a platform where students, scholars, and faculty can share their ideas, research insights, and creative expressions that reflect the spirit of scientific inquiry.

**Visiona** represents not only the vision of science but also the vision of our young minds through their imaginative, inquisitive, and determined to contribute to society through knowledge and innovation. I sincerely appreciate the efforts of the editorial team, contributors, and all those who worked tirelessly to bring this publication to life.

I hope this E- newsletter inspires readers to explore the wonders of science, to think beyond boundaries, and to carry forward the quest for knowledge with passion and integrity.

With best wishes





## PROF. DEVMANI PANDEY

Professor, Department of Bioengineering and  
Biotechnology,  
Birla Institute of Technology, Mesra, Ranchi  
Jharkhand, India

# Message from Dignitary

Dear Science lovers,

It is a great privilege and immense pleasure to know that a popular science E- newsletter **"VISIONA"** is being prepared by the School of Science, YBN University, Ranchi (Jharkhand) and will be released.

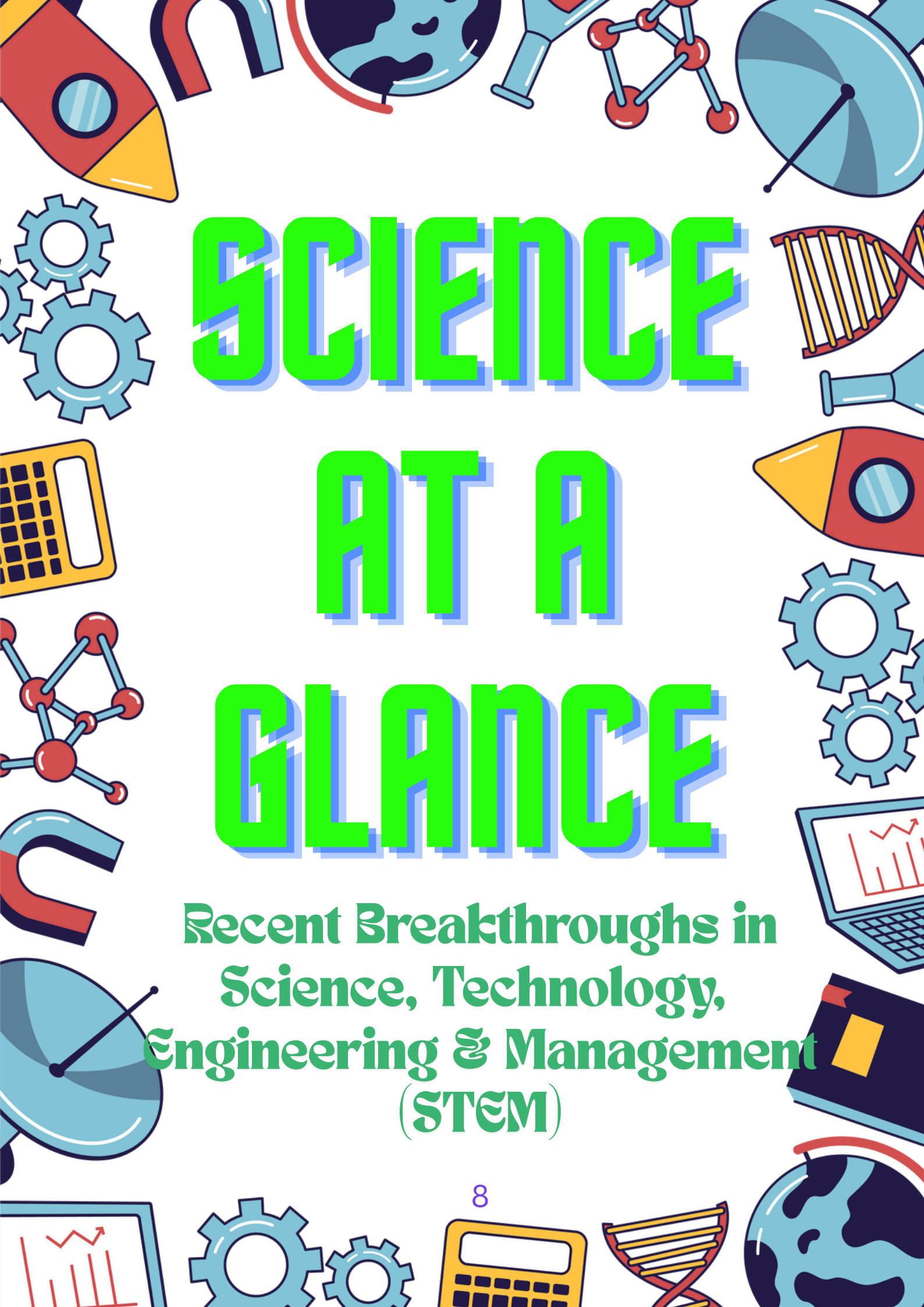
Articles incorporated in the E- newsletter are related to diverse areas pinpointing the current upcoming challenges of Science including human health, food security, waste to wealth etc. are of today's need and very much relevant to the occasion.

Popularizing such information will increase the awareness in the mentioned areas; discovering the existing problems and their possible solutions and finally contributing towards making India a self-reliant nation "Aatmanirbhar Bharat".

I congratulate to all the committee members who are associated in the publication of this Science E- newsletter.

I convey my best wishes and trust that this E- Newsletter will succeed in its mission towards spreading the Science among the people and also will play an important role in the development of State and Nation.

With best Wishes

The background of the slide is decorated with a variety of colorful icons representing different fields of science and technology. These include a red and yellow rocket, a blue and white satellite dish, a DNA double helix, a blue and white calculator, a blue and white laptop, a blue and white globe, a blue and white magnifying glass, a blue and white microscope, a blue and white test tube, a blue and white beaker, a blue and white flask, a blue and white pipette, a blue and white dropper, a blue and white syringe, a blue and white needle, a blue and white scalpel, a blue and white pair of forceps, a blue and white pair of pliers, a blue and white pair of scissors, a blue and white pair of tweezers, a blue and white pair of gloves, a blue and white pair of shoes, a blue and white pair of pants, a blue and white pair of socks, a blue and white pair of underwear, a blue and white pair of pajamas, a blue and white pair of slippers, a blue and white pair of shoes, a blue and white pair of pants, a blue and white pair of socks, a blue and white pair of underwear, a blue and white pair of pajamas, a blue and white pair of slippers.

# SCIENCE AT A GLANCE

Recent Breakthroughs in  
Science, Technology,  
Engineering & Management  
(STEM)

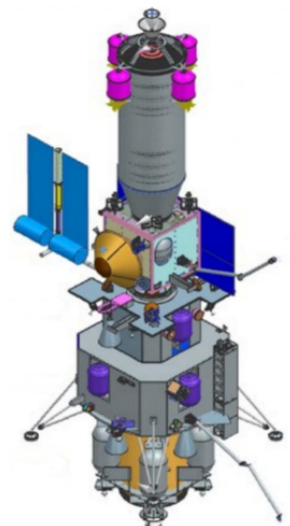
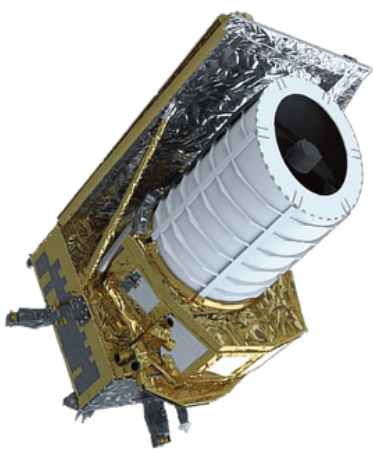


# SPACE & ASTRONOMY

Meanwhile, India's space program took a bold step forward. The Indian Space Research Organisation (ISRO) announced Chandrayaan-4, the nation's first lunar sample-return mission (ISRO, 2025). By attempting to bring Moon soil and rock back to Earth, India joins a select group of nations advancing our understanding of the solar system's early history.

Space exploration reached new heights this quarter. NASA's Europa Clipper mission entered its final testing stage ahead of its scheduled October 2025 launch (NASA, 2025a). The spacecraft is designed to investigate Europa, one of Jupiter's moons believed to host a subsurface ocean beneath its icy crust. The mission could provide the first concrete evidence of habitable conditions beyond Earth.

In Europe, the European Space Agency's Euclid telescope unveiled the largest-ever 3D map of dark matter, charting more than 50 million galaxies (ESA, 2025a). Since dark matter shapes the universe's structure but cannot be observed directly, this breakthrough helps scientists better understand one of the universe's deepest mysteries.





# HEALTH & MEDICINES

➤ **Healthcare also saw transformative progress. A universal influenza vaccine entered early human trials and demonstrated broad protection against multiple strains of flu (Nature, 2025). By targeting viral regions that remain stable, this vaccine could one day replace seasonal flu shots, saving millions of lives.**

➤ **In Europe, regulators approved the first AI-powered diagnostic tool for breast and lung cancers (European Commission, 2025). This system outperformed traditional scans in accuracy and speed, enabling earlier and more reliable cancer detection. Experts stress that AI will complement, not replace, human doctors, enhancing medical practice rather than diminishing it.**

➤ **The U.S. Food and Drug Administration (FDA) added to the momentum by approving the first CRISPR-based therapy for Duchenne muscular dystrophy (FDA, 2025). By correcting genetic errors at their source, the treatment opens the door to curing once-incurable hereditary diseases.**



# TECHNOLOGY & INNOVATION

AI (Artificial intelligence) and digital technologies continued to accelerate innovation. DeepMind introduced AlphaFold-3, an AI system capable not only of predicting protein structures but also designing new ones (DeepMind, 2025). This advancement could revolutionize drug development, industrial enzymes, and synthetic biology.

China achieved a world record in secure communication by transmitting quantum signals over 2,000 kilometers using entangled particles (Xinhua, 2025). This milestone moves the world closer to a quantum internet, promising unhackable communication for governments, finance, and healthcare.

South Korea also made history with the first integrated trial of 5G and 6G networks, achieving speeds fifty times faster than today's standards (Korea Herald, 2025). The future of ultra-fast, terahertz-powered connectivity could soon support applications such as holographic communication and brain-computer interfaces.



## ENVIRONMENT & ENERGY

Gujarat has emerged as a leader in renewable energy with its latest solar panel initiatives. The state recently launched advanced high-efficiency solar panels under the Dholera Solar Park project. These panels, designed for greater energy output and durability, support India's clean energy mission and promote sustainable industrial as well as domestic power solutions.

In August, researchers engineered a plastic-eating enzyme that breaks down polyethylene terephthalate (PET) in mere hours (Science, 2025). This breakthrough could revolutionize recycling and significantly reduce plastic waste in oceans and landfills.

Finally, Germany inaugurated the world's first large-scale green hydrogen-powered steel plant (Guardian, 2025). By replacing coal with renewable hydrogen, this initiative drastically reduces emissions in one of the most polluting industries, offering a roadmap for sustainable heavy industry worldwide.







# FACULTY ACHIEVEMENTS

## Publications / Awards / Participations

**Journal of Neonatal Surgery**  
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Vol. 13, (2024)  
<https://www.jneonatsurg.com>

OPEN ACCESS

**A Study on Qualitative Phytochemical Analysis of Selected Medicinal Plants from Jharkhand**

**Frontiers in Health Informatics**  
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[www.healthinformaticsjournal.com](http://www.healthinformaticsjournal.com)

2024; Vol. 13: Issue 7

Open Access

**A Study on Determination of Antidiabetic Potential of Selected Medicinal Plants from  
Jharkhand**

# An Ethnobotanical Survey of Medicinal Plants and Associated Traditional Knowledge Among the Tribal Communities of Jharkhand, India

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**Annotation:** This ethnobotanical study documents the traditional medicinal practices of tribal communities in Jharkhand through a survey of 50 informants, comprising 30 males and 20 females aged 35–85 years (mean age: 62). A majority (75%) were above 60 years, with 60% serving as traditional healers, underscoring the centrality of elders in safeguarding indigenous knowledge. Informants reported 45 medicinal plant species belonging to 32 families and 41 genera. The Lamiaceae, Fabaceae, and Asteraceae families were most represented. Leaves emerged as the dominant plant part (32.5%), followed by roots (24%) and bark (15%), highlighting both therapeutic versatility and potential ecological risks from unsustainable root and bark harvesting.

Medicinal plants were most frequently used for gastrointestinal disorders (22.5%), dermatological conditions (20%), and respiratory problems (15%), reflecting community health priorities shaped by local living conditions. High Informant Consensus Factor (ICF) values for gastrointestinal (0.90) and respiratory



## Documentation and Validation of Indigenous Plant-Based Remedies for Respiratory Ailments in the Chota Nagpur Plateau of Jharkhand: A Case Study

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**Annotation:** An ethnobotanical survey was conducted among 50 informants from tribal communities of the Chota Nagpur Plateau to document and validate indigenous plant-based remedies for respiratory ailments. The demographic analysis revealed 30 males (60%) and 20 females (40%), with ages ranging from 35 to 85 years (mean 62 years), and 75% of informants over 60, highlighting the concentration of traditional knowledge among the elderly (Table 01). Traditional healers (vaidyas) constituted 60% of participants, followed by farmers (30%) and others (10%), emphasizing the role of experienced practitioners. A total of 45 medicinal plant species were recorded, of which eight species were primarily used for respiratory disorders (Table 02, Figure 01). Leaves were the most frequently used plant part, reflecting sustainable harvesting practices. Key species included *Adhatoda vasica*, *Justicia adhatoda*, *Ocimum sanctum*,

## A Study on Determination of Antidiabetic Potential of Selected Medicinal Plants from Jharkhand

Deepa Sinha<sup>1</sup>, Veermani Kumar<sup>2</sup>, Kamal Kant Patra<sup>3</sup>, Asha Mishra<sup>4</sup> Keshamma E<sup>5\*</sup>

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### ABSTRACT

Diabetes mellitus is a metabolic condition characterized by insufficient or absent insulin production from the pancreas. The development and progression of its long-term complications are closely linked to the extent of hyperglycemia and overall metabolic regulation. Effective management primarily focuses on reducing elevated blood glucose levels and limiting intestinal glucose absorption by inhibiting key carbohydrate-metabolizing enzymes, such as alpha-amylase and alpha-glucosidase. Thus, we aimed to evaluate the aqueous and ethanolic extracts of selected plants from Jharkhand viz. *Dolichos trilobus*, *Atylosia cajanifolia*, *Vicia faba*, and *Vigna umbellata* in comparison with standard Acarbose antidiabetic drug. Results revealed that *Vicia faba* had been the most effective ethanolic extract, showing strong inhibition and the lowest IC<sub>50</sub> value (51.90µg/mL) followed by ethanolic extract of *Atylosia cajanifolia* (68.40µg/mL). While, ethanolic extracts of *Vigna umbellata* (74.20µg/mL) and *Dolichos trilobus* (78.10µg/mL) have shown moderate alpha-amylase inhibition activity. Aqueous (aq.) extract of *Vicia faba* exhibited an effective alpha-amylase inhibition activity with lowest IC<sub>50</sub> value (61.30µg/mL) followed by aq. extracts of *Atylosia cajanifolia* (72.80µg/mL), *Vigna umbellata* (79.50 µg/mL), and *Dolichos trilobus* (85.40 µg/mL). In conclusion, *Vicia faba* showed the most potent alpha amylase inhibitory activity in both aqueous and ethanolic extractions. Hence, aqueous and/or ethanolic extracts of *Vicia faba* could be explored as natural antidiabetic agent in the development of natural antidiabetic formulations.

**Keywords:** *Vicia faba*, Alpha-amylase, Acarbose, Antidiabetic, Jharkhand



## A Study on Qualitative Phytochemical Analysis of Selected Medicinal Plants from Jharkhand

Deepa Sinha<sup>1</sup>, Veermani Kumar<sup>2</sup>, Kamal Kant Patra<sup>3</sup>, Asha Mishra<sup>4</sup>, Keshamma E<sup>5\*</sup>

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*Cite this paper as:* Deepa Sinha, Veermani Kumar, Kamal Kant Patra, Asha Mishra, Keshamma E, (2025) Exploring the Relationship between Screen Time and Developmental Delays in Early Childhood. *Journal of Neonatal Surgery*, 13, 1302-1309.

### ABSTRACT

Medicinal plants remain a primary source of healthcare in rural and tribal communities where access to modern medical facilities is limited. Tribal communities rely heavily on forests for their livelihoods and cultural practices. The Jharkhand, located in eastern India is one such state. Hence in the current we aimed for qualitative analysis of aqueous (aq.) and ethanolic extracts of four selected medicinal plants from Jharkhand state viz. *Dolichos trilobus*, *Atylosia cajanifolia*, *Vicia faba*, and *Vigna umbellata*. Results showed that *Vicia faba* exhibited the maximum extractive potential in both aq. and ethanolic solvents, highlighting its rich phytochemical content. The phytochemical profile of aq. plant extracts indicates that all four species of plants are rich in alkaloids, phenolics, flavonoids, saponins, and proteins, while terpenoids were unique to *Vicia faba*. The ethanolic plant extracts had shown a rich presence of alkaloids, phenolic compounds, flavonoids, and saponins across all species, while terpenoids had been exclusive to *Vicia faba*. The occurrence of proteins had been limited to *Vicia faba* and *Vigna umbellata*. In conclusion, the uniform presence of multiple bioactive compounds in selected medicinal plants from Jharkhand state viz. *Dolichos trilobus*, *Atylosia cajanifolia*, *Vicia faba*, and *Vigna umbellata* underlines their potential for pharmacological and nutraceutical applications..

**Keywords:** Jharkhand, Medicinal plants, Phytochemicals, Alkaloids, Flavonoids, Saponins

### 1. INTRODUCTION

Nature has been a source of medicinal agents for thousands of years.<sup>1</sup> Chemicals derived from plants have recently attracted a lot of attention due to their wide variety of medicinal applications. Medicinal plants are collection of species that accrue variety of active ingredients that are effective in treating a range of human and animal ailments.<sup>2</sup> Most drugs in the past i.e., allopathic, ayurvedic and homeopathic medicines were made from plants. Medicinal plants have secondary metabolites, and these secondary metabolites are the main source of medicinal products with therapeutic effects.<sup>3</sup> Furthermore, dietary phytochemicals are considered as an effective tool to cure various human physiological disorders.<sup>4</sup>

The modern pharmacopoeia still includes at least 25% of medications originated from plants, as well as numerous synthetic equivalents based on prototype chemicals extracted from plants. The growing expenses of prescription pharmaceuticals in the maintenance of human health and wellbeing, as well as the bioprospecting of novel plant-derived drugs, have fueled interest in medicinal plants as a re-emerging health assistance.<sup>5</sup> The increased acknowledgment of therapeutic plants is attributable to a variety of factors, including growing confidence in herbal treatment.<sup>6</sup> In addition, a growing dependence on the usage of plants for medicinal purposes in industrialized countries may be traced back to the extraction and production of



# Valorization of Paddy Straw Mushroom (*Volvariella volvacea*) Stalk Waste as Supplemented Fish Feed to Ameliorate the Oxidative Stress and DNA Damage Induced by Herbicide Penoxsulam

Madhumanti<sup>1</sup> · Sushant Kumar Verma<sup>1</sup>

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## Abstract

The present study has been carried out to valorize the by paddy straw (*Volvariella volvacea*) mushroom stalk waste (MSW) as supplemented diet for *Labeo rohita* to ameliorate the oxidative stress and genotoxicity induced by herbicide penoxsulam (PNX). Fish were exposed to environmentally relevant (ERC) and sub-lethal concentration (SLC) of PNX for 30 days and were fed with basal and supplement diet containing 1, 2 and 4% of MSW. Oxidative stress was measured through lipid peroxidation and antioxidant enzyme activities in liver tissue while genotoxicity was measured in RBC through micro-nucleus test and comet assay. Increased level of oxidative stress but no genetic damage was observed in fish exposed to ERC of PNX and fed with basal diet. Whereas both increased level of oxidative stress and genotoxicity were noted in fish fed with basal diet and exposed to SLC of PNX. In fish that were exposed to either ERC or SLC of PNX but fed with experimental diets were found to have comparatively decreased levels of oxidative stress and genetic damage. This clearly indicates that the *V. volvacea* MSW supplemented diet has ameliorated the levels of oxidative stress and genetic damage in PNX exposed *L. rohita*. Bioactive compounds present in the MSW reduced the level of oxidative stress and genetic damage probably through free radical scavenging. Thus *V. volvacea* MSW can be used in fish feed formulations to maintain the antioxidant status and genetic integrity and also to solve the problem of MSW disposal from mushroom production farms.

**Keywords** Valorization · Mushroom stalk waste · *Volvariella volvacea* · Penoxsulam · Oxidative stress · DNA damage · *Labeo rohita*

## Introduction

Due to increase in agricultural production, the generation of agricultural waste is also increasing. These agricultural wastes has been identified as a major contributor to environmental pollution and degradation, posing risks to air, water, and soil quality [1–3]. To mitigate these adverse effects, it is essential to adopt sustainable waste management practices in agriculture. This includes promoting recycling and reuse of agricultural waste, implementing proper waste disposal

techniques, and adopting alternative methods for nutrient management.

Paddy straw mushroom (*Volvariella volvacea*) is recognized for its nutritional richness, including proteins, dietary fibres, vitamins, and minerals, which contribute to its potential health-promoting properties [4–6]. Cultivation of *V. volvacea* generates significant amount of stalk waste (MSW), the disposal of which is a serious concern. The improper disposal of *V. volvacea* stalk waste has been associated with environmental pollution, soil degradation, and the emission of harmful gases [7–9]. Due to the presence of many bioactive compounds, the generated MSW can be used as dietary supplements for fish.

Herbicides are chemicals used to kill unwanted plants or weeds. Improper and excessive use of herbicides can have harmful effects on non-target organisms. Herbicides are mainly used in agriculture fields. Runoff and leaching of

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# Designer Babies: Ethical, Scientific, and Social Implications

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## Abstract

The advancement of genetic engineering, particularly CRISPR-Cas9, has opened new frontiers in human genome modification, leading to the concept of "designer babies." This paper reviews the scientific principles, ethical concerns, potential benefits and societal impacts of genetically modified embryos. Here, we discuss the feasibility of genetic modifications for eliminating genetic diseases and enhancing human traits, while considering the ethical dilemmas posed by such interventions. Globally, we explore the legal and regulatory landscape governing genetic interventions.

**Keywords:** Designer babies, CRISPR-Cas9, genetic engineering, gene editing, germline modification, bioethics, hereditary diseases, genome editing, human enhancement, regulatory policies.

## 1. Introduction

Designer babies refer to genetically modified embryos with pre-selected or altered genetic traits. The emergence of genome-editing technologies like CRISPR-Cas9 has made targeted interventions possible, sparking debates among scientists, ethicists, and policymakers (Doudna & Charpentier, 2014). While gene editing promises for preventing hereditary diseases, concerns regarding its ethical, social, and legal complications remain (Lanphier et al., 2015).

### 1.1 Designer Baby

The terminology "designer babies" will common for everyone as soon. A designer baby is a genetically transformed (or gene-edited) embryo for producing a child with specific characters. Either some unfavorable characteristics like hereditary disease may be removed, or favorable characteristics (like enhanced mental and physical power) might be incorporated. Designer children, once considered the realm of science fiction, are now becoming a reality. This emerging technology is raising important points about the process and its implications. At the forefront of this debate is the concept of "designer babies" or "super babies" - children whose genetic makeup has been intentionally altered to insert desirable traits.

Designer babies have been the subject for social and ethical discussion over the years. Particularly, there have been many ethical and social probes surrounding genetic transformations and their purposes. Designer babies mean to "construct" babies *in vitro*, and tell the story of evolution for IVF technology.

### 1.2. Process for Designer Babies Creation

Designer babies, also known as genetically modified (GM) babies, are the result of advanced In Vitro Fertilization (IVF) technology. Following the breakthrough in creating babies through *in vitro* methods, scientists took a significant step forward by editing embryos to produce healthy, genetically transformed



<https://africanjournalofbiomedicalresearch.com/index.php/AJBR>

Afr. J. Biomed. Res. Vol. 27(4s) (November 2024); 17306-17311

Research Article

# Study Of Anticancer Efficacy of Indigenous Indian Medicinal Plants Against Breast Cancer For Affordable Drug Development

Manish Kumar<sup>1\*</sup>, Dr. Asha Mishra<sup>2</sup>, & Dr. Arun Kumar<sup>3</sup>

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## Abstract

Cancer is a complex group of diseases characterized by uncontrolled cell growth and transformation of normal cells into abnormal cells due to loss of regulatory mechanisms that causes cells evade normal growth and death processes. Cancer cells can invade surrounding tissues. Globally, breast cancer is the most commonly diagnosed cancer among women and is one of the most significant causes of death. The second most common cause of mortality in women is malignancy and its metastatic state. According to recent global reports, 2.3 million women were diagnosed with breast cancer in 2020, resulting in approximately 685,000 deaths. Current projections indicate a 38% increase in incidence and a 68% rise in mortality by 2050. The World Health Organization's (WHO) GBCI aims to reduce breast cancer mortality by 2.5% annually, potentially saving 2.5 million lives between 2020 and 2040. This initiative focuses on early detection, timely diagnosis and comprehensive management.

7,12-Dimethylbenz[a]anthracene (DMBA), a well-established polycyclic aromatic hydrocarbon (PAH), is commonly used to induce breast cancer in experimental rat models. Currently used chemotherapeutic agents like paclitaxel and tamoxifen are the most commonly used drugs against cancer. These chemotherapeutic agents are costly and have very intense side effects along with their limitations. The quest for safer and more affordable alternatives has sparked renewed interest in ancient Indian medicinal plants, as documented in traditional texts like Vedas and Ayurveda under the Indian Knowledge System (IKS). These plant-based therapies possess bioactive compounds with known anticancer potential. This study focuses on evaluating the anticancer efficacy of selected ancient Indian medicinal plant extracts against breast cancer, particularly in the context of 7,12-Dimethylbenz[a]anthracene (DMBA)-induced mammary carcinoma models.

Our preliminary findings indicate that certain medicinal plant extracts exhibit promising anticancer activity with fewer side effects, highlighting their potential as cost-effective, natural alternatives to conventional treatments. Further molecular characterization and clinical studies are required to validate these findings and facilitate the development of affordable, plant-based anticancer drugs.

## Keywords

Breast cancer, Indigenous medicinal plants, Anticancer activity, DMBA-induced carcinoma, Ayurveda, Affordable drug development, Natural bioactive compounds

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# INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)

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## RESEARCH ARTICLE

### SELECTION AND CULTIVATION OF A HIGH-YIELDING STRAIN OF SPIRULINA PLATENSIS

Aparajita Yadav and Asha Mishra

1. Department of Biotechnology, YBN University, Ranchi, India.

#### Manuscript Info

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##### Key words:-

Spirulina platensis, biomass productivity, strain selection, protein content, growth optimization, commercial cultivation

#### Abstract

*Spirulina platensis*, a filamentous cyanobacterium, is globally recognized for its high protein content, bioactive compounds, and health-promoting properties. Enhancing biomass productivity through strain selection and optimized cultivation is crucial for meeting commercial demands in nutraceutical and pharmaceutical industries. This study aimed to identify and cultivate a high-yielding *S. platensis* strain with superior growth performance and nutritional quality. Three strains (SP1, SP2, SP3) were grown in BG11, Zarrouk's, and Modified Zarrouk's media under controlled laboratory conditions for 30 days. Growth was assessed via optical density at 680 nm ( $OD_{680}$ ), biomass yield ( $g\ L^{-1}\ day^{-1}$ ), and protein content using the Lowry method. SP2 achieved the highest biomass productivity ( $0.08\ g\ L^{-1}\ day^{-1}$ ) and protein content ( $62.5 \pm 2.9\%$ ) in Modified Zarrouk's medium, outperforming SP1 and SP3. These results indicate that SP2 is a promising candidate for large-scale cultivation due to its yield potential and nutritional profile, supporting applications in sustainable protein production, nutraceuticals, and pharmaceuticals.

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#### Introduction:-

*Spirulina platensis* is a filamentous, photosynthetic cyanobacterium widely used as a nutritional supplement and functional food ingredient due to its high protein content (55–70%), essential amino acids, vitamins, minerals, and antioxidant pigments like C-phycoerythrin. Its applications span nutraceuticals, pharmaceuticals, cosmetics, and aquaculture feed.

With the growing global demand for sustainable protein sources, optimizing *Spirulina* cultivation for higher yield and nutritional value has become a priority. Biomass productivity is influenced by multiple factors, including strain genetic potential, medium composition, light intensity, pH, and temperature. Strain selection plays a pivotal role, as different isolates exhibit varied growth rates, nutrient utilization efficiencies, and biochemical profiles.

This study focuses on selecting a high-yielding *S. platensis* strain through comparative growth assessment in three commonly used culture media—BG11, Zarrouk's, and Modified Zarrouk's—under controlled laboratory conditions.

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# ADDITIONAL PUBLICATIONS

## Authors Name

## Publications

**Piu Sasmal**  
**Dr. Abha Kumari &**  
**Dr. Kamal Kant Patra**

*In Vitro* Assessment of Anti-Diabetic And Health-Promoting Effects of Fatty Acids from *Vicia faba* Seeds Collected in East Medinipur, West Bengal, BIJMRD Volume: 3| Issue: 01| January 2025| e-ISSN: 2584-1890, doi.org/10.70798/Bijmrd/03010011

Health-Promoting Effects of *Vicia faba* Seed Fatty Acids: Potential Applications in Functional Foods and Nutraceuticals, BIJMRD Volume: 3| Issue: 03| March 2025| e-ISSN: 2584-1890, doi.org/10.70798/Bijmrd/03030021

**Jaybendra Yadav**  
**Dr. Veermani Kumar,**  
**Dr. Keshamma E.**  
**Dr. Asha Mishra**

*In Vitro* Evaluation of Electrochemically Activated Aqueous Solutions: A Comprehensive Study on Their Antibacterial Efficacy and Cleaning Potential Against *Escherichia Coli* and *Staphylococcus Aureus*

Evaluating the Antimicrobial and Anti-Biofilm Efficacy of Electrochemically Activated Solutions on Pathogen-Contaminated Surfaces: A Comparative Study of *Escherichia Coli* and *Staphylococcus Aureus*

**Nikkita Rani Farikar &**  
**Dr. Asha Mishra**

Antioxidant, Anti-inflammatory Effects of Selective Legume Extracts of Balangir District, Odisha, BIJMRD Volume: 3| Issue: 01| January 2025| e-ISSN: 2584-1890, doi.org/10.70798/Bijmrd/03010012

Protective Effects Against Oxidative DNA Damage And Cell Signaling Exhibited by Selective Legume Extracts from Balangir District, Odisha, BIJMRD Volume: 3| Issue: 03| March 2025| e-ISSN: 2584-1890, doi.org/10.70798/Bijmrd/03030017



## Authors Name

## Publications

**Papiya Ghorai Manna,  
Dr. Kamal Kant Patra,  
Dr. Asha Mishra,  
Dr. Keshamma E**

*Analysis of the Functional Properties of Isolated LAB Strains Present in Rice Based Fermented Foods of West Bengal, International Journal of Trend in Scientific Research and Development (IJTSRD), Volume 9 Issue 2, Mar-Apr 2025 Available Online: [www.ijtsrd.com](http://www.ijtsrd.com) e-ISSN: 2456 – 6470*

**Kalyan Sur, Md.  
Shahid**

*Characterization and antioxidant, Anti-diabetic & Phytochemical Studies of SamaneaSaman flower” International journal of research in Engineering and Applied Sciences (IJREAS), Vol. 15, Issue 01, January-2025, Page No. 53-66 (ISSN No. (O) 2249-3905, ISSN No. (P) 2349-6525).*

**Kalyani Kumari &  
Dhrub Kumar Singh**

*Application of hypergeometric function involved two or more variables, International Journal of Statistics and Applied Mathematics 2025; 10(1): 182-194, ISSN: 2456-1452*

**Upendra Yadav and  
Dhrub Kumar Singh**

*Generalized aggregation operations based on t-norm operations for complex intuitionistic fuzzy sets, International Journal of Statistics and Applied Mathematics 2025; 10(1): 162-169, ISSN: 2456-1452*

**Deepa Sinha  
Dr. Veermani Kumar  
Dr. Kamal Kant Patra  
Dr. Asha Mishra**

*Documentation and Validation of Indigenous Plant-Based Remedies for Respiratory Ailments in the Chota Nagpur Plateau of Jharkhand: A Case Study, American Journal of Biology and Natural Sciences, Volume:2 | Number:325 4 (2025) April, ISSN: 2997-7185*

*An Ethnobotanical Survey of Medicinal Plants and Associated Traditional Knowledge Among the Tribal Communities of Jharkhand, India, American Journal of Botany and Bioengineering, Volume: 2 | Number: 2 (2025), Feb, ISSN: 2997-9331*

# Ph.D. AWARDS / SUBMISSION

## 06 02



**Irfana Nahid**

Enrol No.: YBNU2003384

Chemistry

Viva Voce Date: 26/07/2025

Session: 2020

**Supervisor: Dr.Ajit Kumar, Assistant Professor, Chemistry**

**Title: A QUINOLINE-ISATIN ANCHORED FLUORESCENT PROBE FOR RECOGNITION OF MAGNESIUM ION**

**Kalyan Sur**

Enrol no.: 1907011349

Chemistry

Date of Viva: 22/07/20

Session: 2020

**Supervisor: Dr. Md. Shahid, Assistant Professor, Chemistry**

**Title: Phytochemical characterization and pharmacological activities of Samaneasaman: An Ethnomedicinal perspective**



**Kalyani Kumari**

Enrol No.: YBNU2002943

Mathematics

Date of Viva: 02/08/2025

Session: 2020

**Supervisor: Dr.Dhrub Kumar Singh, Assistant Professor, Mathematics**

**Title: A study on the influence of maternal fetal and child nutrition on the development of chronic disease in later life in India**





**Niharika**

Enrol No.: YBNU2001621

Zoology

Date of Viva: 23/06/2025

Session: 2020

**Supervisor: Prof. NupurLal, Professor, Zoology**

**Title: Diversity, Habitat Preference and seasonal distribution of Butterflies in various habitats of Ranchi**

**Upendra Kumar Yadav**

Enrol no.: YBNU2002942

Mathematics

Date of Viva: 02/08/2025

Session: 2020

**Supervisor: Dr.Dhrub Kumar Singh, Assistant Professor, Mathematics**

**Title: A Few Aggregation operations and Innovative Methods for Making Decisions in Various Fuzzy**



**Stella Mary Mendonca**

Enrl.: 1907010476

Food & Nutrition

Date of Viva: 02/07/2025

Session: 2019

**Supervisor: Dr. Abha Kumari, Assistant Professor, Food & Nutrition**

**Title: IMPACT OF MIDDAY MEAL PROGRAM ON CHILDHOOD NUTRITION AND HEALTH OUTCOME'S WITH SPECIAL REFERENCE TO HAZARIBAG DISTRICT**



**Piu Sasmal**

**Supervisor: Dr. Abha Kumari, Assistant Professor, Food & Nutrition**

**Title: In vitro study on phytonutrients potential and human health promoting properties of fatty acids isolated from seeds of Vicia faba collected from East Medinipur, West Bengal**

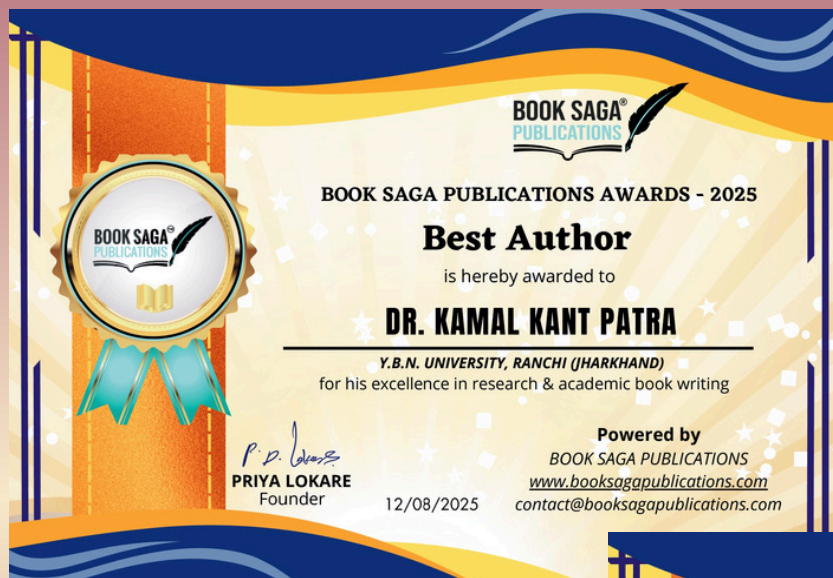
**THESIS SUBMITTED**

**Siddhartha Sankar Ghosh**

**Supervisor: Dr. Veermani Kumar , Assistant Professor, Botany**

**Title: Impact of Phyto-geographical Variation on Phytochemical(s) Content and Antioxidant Activity in Ocimum sanctum Linn. Collected from Different Locations of West Bengal**

**THESIS SUBMITTED**



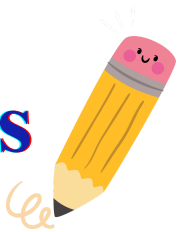




# STUDENT CORNER



- **Articles / Essays / Thoughts / Views**
- **Achievements / Career Enhancement**





# NIHARIKA

PhD Research Scholar

Session: 2020

Dept of Zoology

YBN University, Ranchi

## ALARMING TIME FOR BUTTERFLY CONSERVATION

Butterfly populations are known to be indicators of better environmental conditions. The role of butterflies is very important in pollination, fertilization chain, and also in the ecosystem. But, due to increasing pollution rate day by day, use of pesticides, indiscriminate cutting of forests, and due to continuous climate change, the population of butterflies is in danger.

According to the Zoological Survey of India, a total of 1318 species of butterflies have been recorded in India. According to ICUN, about 40 species of butterflies in India have come under the critically endangered range on the basis of their existence.

If butterflies get extinct from the earth, then we can be deprived of various fruits and flowers and agricultural products prevalent in today's time.

According to FAO, an organization of the United Nations, 75% of the farming and agricultural products on the earth mainly depend on pollination.

Environmentalists believe that the extinction of these beautiful and innocent butterflies can have an impact on the existence of other living beings as well.

According to a statement of the Forest and Climate Change of the Government of India, providing encouragement for the conservation of rare and endangered butterflies in India, financial assistance is being provided for the establishment of butterfly parks at the state level.

The perfect example of this plan are states like Madhya Pradesh, Karnataka, Himachal Pradesh and Maharashtra where special protected areas have been set up for butterfly conservation.

In addition, the Government of India's Wildlife Protection Act - 1972 includes 126 species of butterflies in Schedule I, 299 species under Schedule - II and 18 species under Notification - 4.

The Zoological Survey of India, under the National Himalayan Study Mission for the conservation of rare and endangered butterflies, studied butterflies as active pollinators in the Himalayan region and found that there has been a significant decrease in the diversity of butterflies.

Therefore, the time is now to do immense research on butterflies by awakening consciousness and enriching butterfly diversity by giving priority to butterfly conservation in view of future times.



# NIKKITA RANI FARIKAR

PHD RESEARCH SCHOLAR  
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YBNUR

## ***THE CHANGING SEASON AND LIFE***



The story of the earth and of the life that flourishes upon it is one of constant change. The soil, the rocks, the temperature, and the pressure of the atmosphere are never exactly the same today as they were yesterday and as they will be tomorrow. Perhaps the most striking changes in nature that profoundly affect life are brought about by the alternation of the seasons. To some forms of life, this brings death; to some, a desperate struggle for survival; to others, a borderline existence that seems only a parody of life; to still others, a necessary respite. The coming of winter in the temperate and frigid zones destroys some green vegetations and greatly restricts the activities of others. Annual plants, which develop fully in the course of a single season, die and leave their seeds behind them. During the cold season, these seeds lie dormant; when balmy weather returns, they seem to awake, stir and set about the business of renewing the species. Biennial plants, which require two growing seasons for their full development, generally die down to the surface of the ground at the end of their first season and develop new growths from under ground parts the following spring.

All forms of life are dependent upon green plants, the only living things that can make foods out of inorganic substances. These green plants literally feed the world; the extent to which they flourish within a given area determines the population of animals and non-green plants, such as mushrooms and bacteria, in that area.

When the life processes of green plants are slowed down with the coming of winter, the basic food supply becomes greatly reduced. It is then quite impossible for the host of living things that flourished during warm weather to continue its activities as before. As a result, there is a decided drop in the population of living creations.

Animal without backbones, including such types as protozoans, worms, mollusks, crustaceans and insects, are much less in evidence after the first frost. Many die, leaving behind them only eggs or young in various stages of development to carry on in another year. Other species remain dormant as long as the cold lingers. A reduction in active population also takes place among the higher animals. In part, this is brought about by migration, which is discussed about by migration.

Certain animals overcome the rigors of winter by hibernating- that is, by passing the winter in an inactive state. Drastic changes take place in the animal's life processes in true hibernation. It is not to be confused with the partially inactive enter when the weather happens to be particularly bad.

A fine example of true hibernation is furnished by a common American ground squirrel which is called the thirteen-lined spermophile. The name is not so formidable as it may seem. It indicates simply that the animal is a seed-lover, for that is what "spermophile" means in Greek, and that it has thirteen stripes along its back. It lives in shallow burrow in pastures and along the border of fields.

# Pragyan Paramita Sinha

*PhD Research Scholar (2019)*

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## Phytochemicals with promising health benefits

For two decades, strong evidence from epidemiological studies and meta-analyses suggests that the long-term consumption of diets rich in plant polyphenols, especially flavonoids, offers protection against degenerative diseases such as cancers, cardiovascular diseases, diabetes, and neurodegenerative diseases.

This beneficial impact has made polyphenols a subject of increasing scientific interest.

What Are Polyphenols?

- Polyphenols are a class of non-nutrient ingredients in our food, often categorized as "nutraceuticals," that are valued as antioxidants and for other protective properties.
- They are essentially phytochemicals (chemical substances from plants) often found in fruits and leaves, believed to protect the plants themselves from pathogens and environmental stress (like UV exposure, excess water, and temperature changes).
- Unlike vitamins, polyphenols are not sensitive to oxidation or light, keeping well inside foods even after cooking.

Dietary Sources and Occurrence

- The most important dietary sources of polyphenols are fruits, vegetables, tea, and the seed coat of grains.
- Fruits like grapes, apples, cherries, and berries contain up to 200–300 mg per 100 g fresh weight.
- Typically, a glass of red wine or a cup of tea or coffee contains about 100 mg of polyphenols. Cloves stand first among food sources, containing up to 15.2 g/100 g.
- Structurally, these compounds vary from simple phenolic acids to highly polymerised compounds like tannins. The most common types in the human diet are phenolic acids, flavonoids, and tannins.

Major Health Benefits

- Polyphenols are excellent antioxidants and can neutralise the destructive reactivity of undesired reactive oxygen/nitrogen species produced during the body's metabolic processes.
- The antioxidant activity of these phytochemicals is thought to be the key factor in their role in the prevention of degenerative pathologies.
- Specific polyphenols have been studied as potential treatments for various metabolic diseases:
  - a. Resveratrol from red wine.
  - b. Quercetin from various sources.
  - c. Curcumin from turmeric, which has been experimentally and clinically validated for its anti-inflammatory potential and studied for lowering the incidence and severity of arthritis and cancer.
- Evidence exists for their role as protective agents against cardiovascular disease, hypertension, certain forms of cancer (including breast, lung, and skin), Type 2 diabetes, aging, and inflammation.

Optimal Intake

In view of the beneficial role of plant-derived polyphenols in human health, a liberal daily intake in the range of 500 to 1,000 mg through the consumption of fruits, vegetables, and whole grains is considered optimal for keeping degenerative diseases at bay.



# *Sukriti Pandey & Simpi Singh,*

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## **ECOSYSTEM FRIENDLY MOSQUITO**

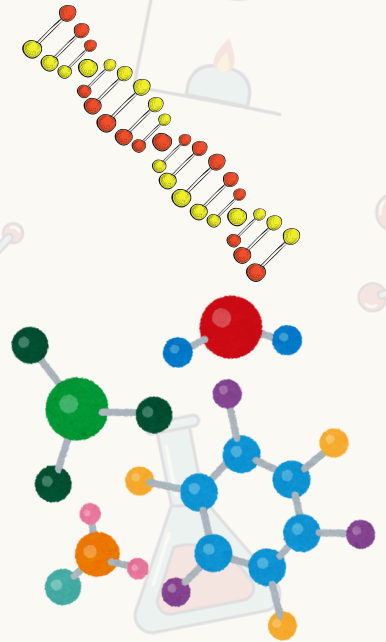
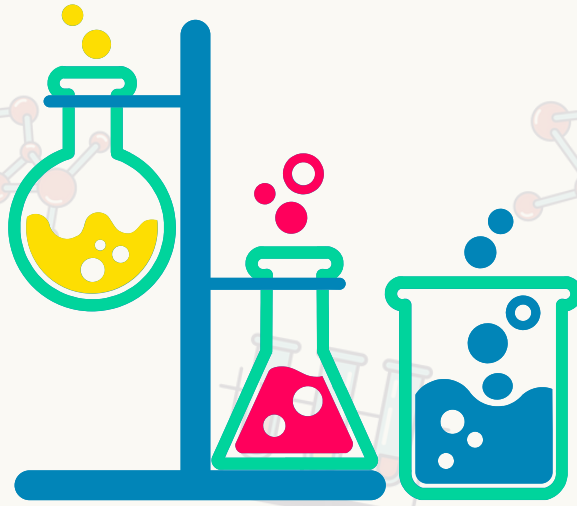
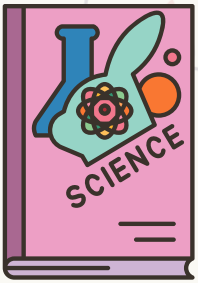
There is general perception that mosquitoes are harmful but however, it is not completely true but, in some cases, mosquitoes are beneficial as well for the ecology and environment.

Following are the research-based evidence statement:

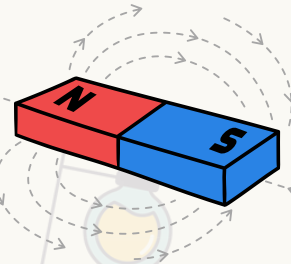
- Serving as a food source for other animals in that food chain, fishes and birds often because the insects are plentiful and easy to catch. Adult mosquitoes are the primary source for other animals such as lizards, frogs etc.
- Mosquitoes often indirect ecological benefits .example: they change caribou`s migration behavior. Mosquitoes are pollinators.
- They do aid in the fertilization of plants by spreading seeds allowing plant reproduction to continue naturally.
- Our natural mosquito products can help protect yourself from those notorious mosquitoes.
- Anopheles gambiae mosquito identify prey to species levels by examining the stomach contents of aquatic predators it is possible to quantify direct and indirect ecological interactions in the environment.
- Indiscriminate mass elimination of mosquitoes would impact everything from pollination to biomass transfer to food webs.
- Plants make use of vast order of vector hungry mosquitoes for pollination during the short growing season.
- Genetic evidence supports a rapid increase in mosquito diversity corresponding with the appearance of flowering plants.
- Mosquito scales have been found in flower fossils from the mid cretaceous era.
- Recent research has discovered that some of the odour constituents of certain flower that mosquito feed on (land pollinate) are shared with human.
- Mosquito help to solve the problem of honeydew because it is hard to find in environment.by using the smell emitted by microbes that line in the honeydew to locate it.

Conclusion:

Infect, mosquitos` primary food source is flower nectar, not blood. Just like bees or butterflies, mosquitoes transfer pollen from flower to flower as they feed or nectar, fertilizing plants and allowing them to form seeds and reproduce.

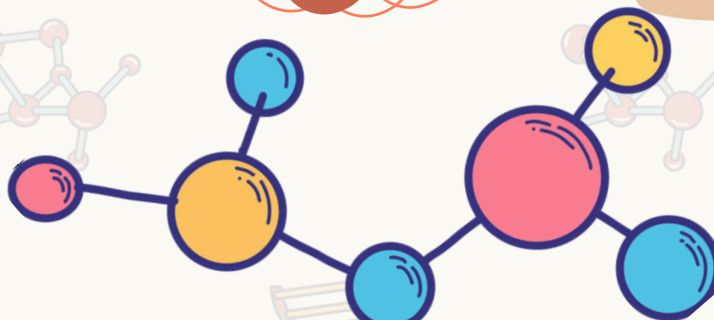
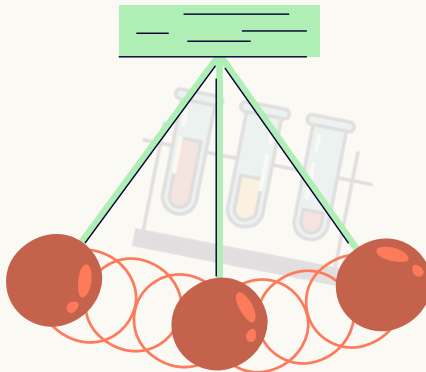
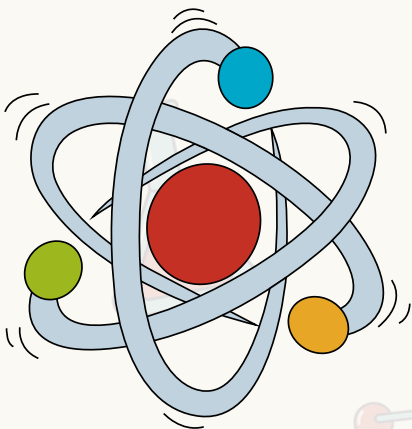


# CREATIVE SCIENCE



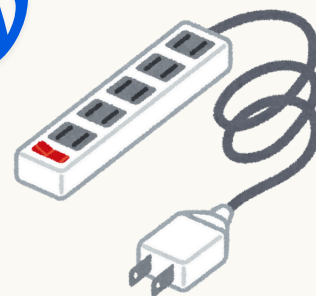
SCIENCE POEMS/ SUCCESS  
STORIES

SCITOOONS, JOKES, AND PUZZLES





## *Foldable Battery like Paper*



Indian scientists develop flexible, safe, and eco-friendly battery: A big step towards sustainable energy

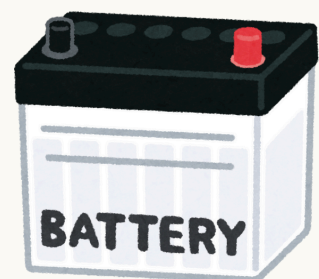
A novel battery technology has been developed by scientists that makes the battery flexible enough to fold like a piece of paper and also is safe enough to touch without any worry.

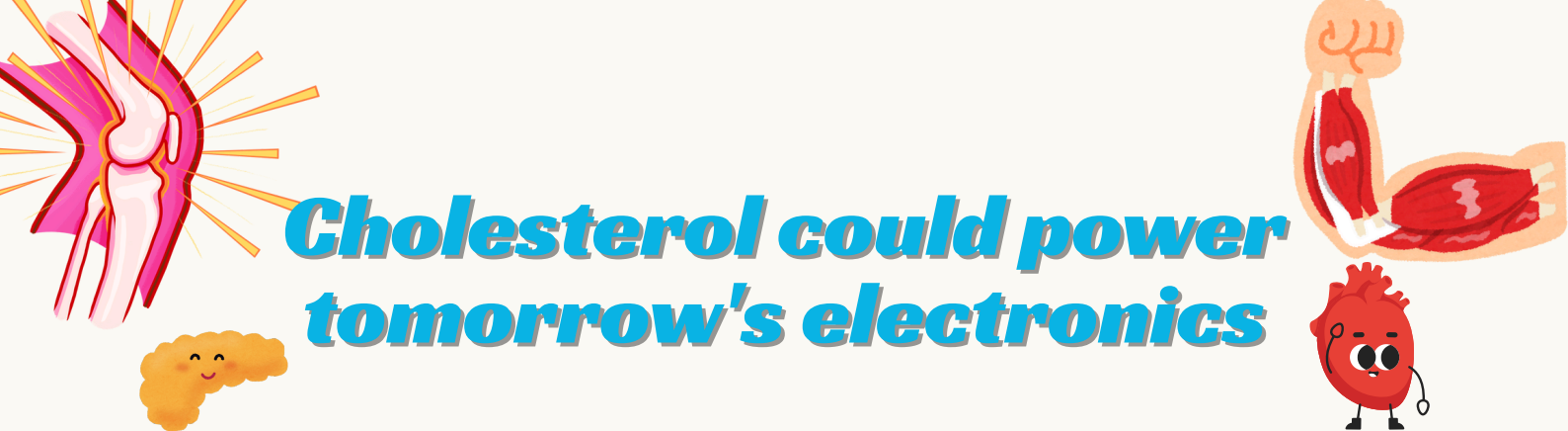
Commonly used Lithium-ion batteries, are prone to overheating and explosion.

Researchers in Bengaluru from the Centre for Nano and Soft Matter Sciences (CeNS), an autonomous institute under the Department of Science and Technology (DST), Government of India, in collaboration with the Centre for Nano Science and Engineering (CeNSE) at the Indian Institute of Science (IISc), have developed a novel battery technology that could serve as an alternative to traditional lithium-ion batteries commonly used in phones, laptops, electric vehicles, and wearable devices.

This new battery uses aluminum—one of Earth's most abundant metals—and a water-based solution. This combination makes it safer, cheaper, and much kinder to our environment. It could protect from battery explosions and environmental hazards, and also reduce the power requirement of our devices.

Although aluminum has great potential because it can store and release energy efficiently, scientists faced problems in practically using it due to its complicated chemistry. The Bengaluru scientists solved these problems by tweaking materials at the microscopic level. They designed a unique cathode (positive part) from a special material called copper hexacyanoferrate ( $\text{CuHCFe}$ ), pre-filled with aluminum ions. They paired this with an anode (negative part) made from molybdenum trioxide ( $\text{MoO}_3$ ), creating a powerful battery that's not just effective but also flexible enough to bend without breaking





# Cholesterol could power tomorrow's electronics

Cholesterol can be used to control the spin of electrons—an invisible quantum property that could contribute to the development of energy efficient next generation spintronic devices.

Cholesterol, the fat like substance which is typically related to heart diseases serves as an ideal platform for constructing supramolecular based spintronic materials.

This is because it enables precise control over molecular properties due to its intrinsic handedness (chirality) and flexibility.

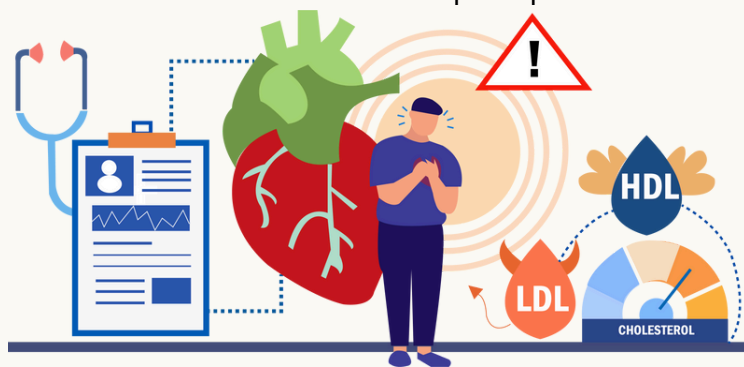
Scientists from Institute of Nano Science and Technology (INST), Mohali, an autonomous institute of the Department of Science and Technology (DST) have introduced cholesterol-based nanomaterials as novel platforms for future quantum technologies and spintronic applications.

These materials could manipulate the spin of electrons-- a quantum feature critical for the next generation of electronics. By combining metal ions with the organic framework, the team of scientists led by Dr. Amit Kumar Mondal have shown that how well a material can separate electrons based on their magnetic "spin" orientation by adjusting the kind and concentration of metal ions.

By combining cholesterol with different metal ions, the researchers created nanomaterials that selectively filter electron spins. Interestingly, both spin directions could be controlled within a single system. This means that with a simple chemical tweak or an achiral chemical stimulus the scientists could tune the flow of spin information. Their findings, recently got published in Chemistry of Materials.

This chemical tunability provides a powerful and elegant technique for manipulating spin information with high precision, representing a substantial advancement in the development of biomaterials for advanced quantum and spin technologies.

This could lead to Energy-efficient memory chips for greener technology and bioelectronic devices, since the spin-based materials can help separate molecules with extreme precision.







# FERMENTED FOOD CAN PERSONALISE NUTRITION FOR INDIA'S DIVERSE POPULATION



A study of population-specific responses to fermented food shows that the health effect of the bioactive peptides they contain, differ across populations and can personalise nutrition for India's diverse population.

Bioactive peptides from fermented foods are gaining global attention for their health benefits. With advancements in biotechnology and a deeper understanding of individual differences, bioactive peptides could hold great promise for nutrition and health solutions.

A recent study conducted by Institute of Advanced Study in Science and Technology (IASST), Guwahati, an autonomous institute of the Department of Science and Technology (DST) emphasizes the health benefits of traditional fermented foods. They showed that the bioactive peptides (BAPs) or short protein fragments consisting of 2 to 20 amino acids that they contain can regulate blood pressure, blood sugar, immunity and inflammation.

The study published in Food Chemistry (2025), led by Prof. Ashis K. Mukherjee, Corresponding author and Director IASST, Dr. Maloyjo Joyraj Bhattacharjee, Dr. Asis Bala, and Dr. Mojibr Khan showed that foods such as yogurt, idli, miso, natto, kimchi and fermented fish contain high levels of these peptides.

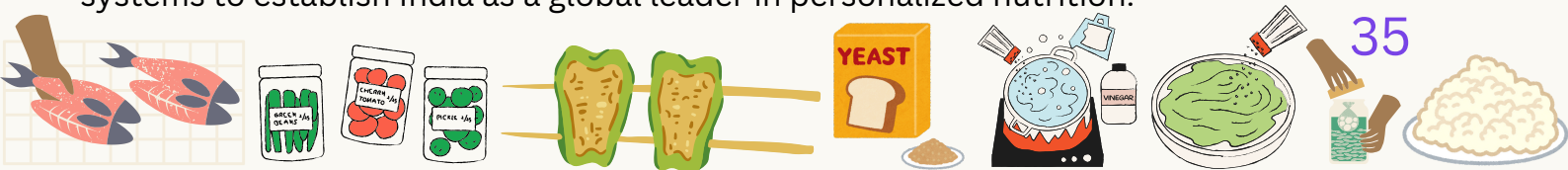
## Fermented food

These short peptides, formed during fermentation, interact with biomolecules through electrostatic forces, hydrogen bonding and hydrophobic interactions to exert antimicrobial, antihypertensive, antioxidant and immune-modulatory effects.

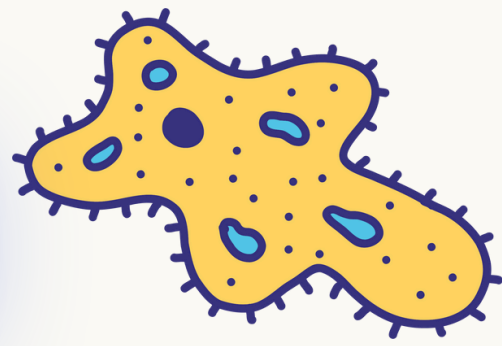
This can influence cardiac function, immune response and metabolic health. However, their bioavailability and effectiveness vary across populations due to genetic polymorphisms, gut microbiota composition, dietary habits and health conditions. Gene variants in ACE or IL-6 may affect individual responses to these peptides. This data emphasizes the necessity for precision nutrition and targeted health interventions customized to the diverse Indian population.

The research published in the Journal Food Chemistry, can address challenges such as variability in fermentation methods, peptide stability and interactions with the microbiota.

The study advocates incorporating traditional fermented foods into public health initiatives. It emphasizes the need for omics-based (biological research that utilize high-throughput technologies to analyze large sets of molecules) research and innovation in rural food systems to establish India as a global leader in personalized nutrition.



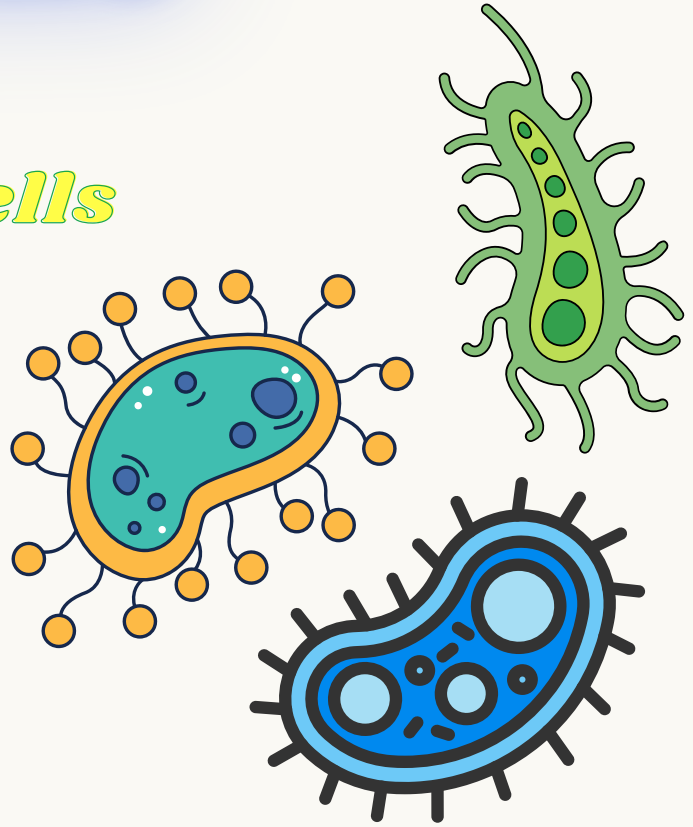
# POEMS



## *The Language of Cells*

In a drop of water,  
a thousand lives unfold,  
each cell a quiet library  
writing its own code.  
Division, rhythm, memory—  
life rehearses endlessly,  
and we,  
only the latest verse  
in its ancient song.

*-Dr. Madhumanti*



## *Stargazer's Equation*



I tilt my face to the night,  
equations scattered like constellations.  
Light-years whisper their secrets—  
time bent, space stretched.  
The universe is solving itself,  
line by glowing line.  
And here I stand,  
a question mark  
with eyes full of stars.

*-Manas Pandey*



# SUCCESS STORIES

## जय धरती माँ फाउंडेशन, धनबाद (झारखंड) संस्थापक – श्री रवि कुमार निषाद

### परिचय

भारत एक कृषि प्रधान देश है, जहाँ गाँव और किसान हमारी संस्कृति, अर्थव्यवस्था और परंपराओं की नींव हैं। झारखंड की धरती अपनी प्राकृतिक संपदाओं, वनों और आदिवासी संस्कृति के लिए प्रसिद्ध है, लेकिन यहाँ के लोग अनेक चुनौतियों का सामना भी करते हैं—जैसे बेरोज़गारी, पलायन, गरीबी और पर्यावरणीय असंतुलन।

इन्हीं चुनौतियों के बीच “जय धरती माँ फाउंडेशन” का जन्म हुआ। यह केवल एक संस्था नहीं, बल्कि एक आंदोलन है जिसने पिछले 12 वर्षों में हजारों किसानों, युवाओं और महिलाओं के जीवन को बदला है।

संस्था के संस्थापक श्री रवि कुमार निषाद ने अपने अनुभवों से यह महसूस किया कि यदि धरती माँ की रक्षा करनी है और समाज को आगे बढ़ाना है, तो केवल भाषणों और नारों से काम नहीं चलेगा। इसके लिए जमीन पर काम करना होगा, पौधे लगाने होंगे, किसानों को प्रशिक्षित करना होगा और युवाओं को आत्मनिर्भर बनाना होगा।

### स्थापना की कहानी

श्री रवि कुमार निषाद का जन्म एक सामान्य परिवार में हुआ। पिता का श्री नाम शिव शंकर मल्लाह और माता श्रीमती पार्वती देवी है। बचपन से ही उन्होंने देखा कि गाँव के लोग रोज़गार की तलाश में पलायन करते हैं, जंगल कट रहे हैं, और खेती करने वाले किसान आर्थिक संकट से जूझ रहे हैं। युवाओं और महिलाओं में कौशल की कमी थी जिसके कारण वे अपने पैरों पर खड़े नहीं हो पा रहे थे। साथ ही धनबाद जिला जिसे कोयले की राजधानी कही जाती है वहीं परप्रदुषण चरम सीमा पर है इसलिए हमने 1 करोड़ पौधारोपण महाअभियान प्रारंभ प्रकार 2012 में “जय धरती माँ फाउंडेशन” की स्थापना धनबाद, झारखंड में हुई।

### संस्था का मुख्य उद्देश्य है –

1. धरती माँ की सेवा – 1 करोड़ पौधारोपण महाअभियान, जल संरक्षण, और वनों की रक्षा, आदिवासीयों की जीवन शैली में उत्थान लाना।
2. किसानों की उन्नति – आधुनिक कृषि तकनीकों का प्रशिक्षण के कार्य जारी है
3. युवाओं और महिलाओं को स्वरोज़गार प्रशिक्षण कार्यशाला जारी है

निःशुल्क शिक्षा केन्द्र , कौशल और 2013 वर्ष से संकल्प शिक्षा जागरूकता के माध्यम से अब तक 13780 विधार्थी को शिक्षित कर चुके हैं साथ ही कई विधार्थीयों का नवोदय विद्यालय, सैनिक विद्यालय में चयन हो चुका है ।

संस्था के प्रमुख पदाधिकारी सह-संस्थापक -रंजीत कुमार, अनुसूचित जनजाति पदाधिकारी -सुधीर हेमब्रम, कार्यक्रम पदाधिकारी -मो० शमशेर अली, जिला सचिव -श्री सहदेव महतो, जिला सह-सचिव- सुरेश हरिजन और सभी सदस्यगण।

संस्था के सह-संस्थापक रंजीत कुमार जी का मानना है कि यदि पर्यावरण सुरक्षित रहेगा तो समाज का भविष्य भी सुरक्षित रहेगा।

### उपलब्धियाँ और सम्मान

“जय धरती माँ फाउंडेशन” ने अपनी मेहनत और समर्पण से कई मुकाम हासिल किए हैं। 22 नवंबर 2024 को दिल्ली में “भारत विभूषण सम्मान” से नवाज़ा गया। अब तक चार अंतर्राष्ट्रीय सम्मान – पर्यावरण संरक्षण में और कृषि के क्षेत्र में इतिहासिक कार्य पे मिला है अब तक 3 राष्ट्रीय सम्मान – ग्रामीण विकास और पौधारोपण के लिए। 112 राज्य स्तरीय पुरस्कार – दिल्ली, इंदौर, झारखंड, बिहार, ओडिशा और बंगाल , और कई राज्यों से मिल चुकी है। जिला स्तरीय 313 सम्मान – विभिन्न स्थानीय निकायों और प्रशासन द्वारा। ये सम्मान केवल पुरस्कार नहीं हैं, बल्कि समाज के विश्वास और संस्था की मेहनत का परिणाम हैं।

### प्रमुख परियोजनाएँ और प्रभाव

1. पौधारोपण महाअभियान 🌱

संस्था ने 1 करोड़ पौधे लगाने का लक्ष्य तय किया। पिछले 12 वर्षों में अब तक 315,700 पौधे लगाए जा चुके हैं। इनमें आम, नीम, पीपल, बरगद, आंवला, गुलमोहर और कई स्थानीय प्रजातियाँ शामिल हैं। इस अभियान का परिणाम: गाँवों का वातावरण हरा-भरा हुआ। भूजल स्तर में सुधार हुआ। कई गाँवों में तापमान में कमी दर्ज हुई।

## 2. फल-फूल की खेती 🍎🌸

संस्था ने अपने खेती के साथ-साथ हजारों किसानों के सहयोग से प्रशिक्षण देकर 150 एकड़ भूमि पर फल और फूलों की खेती करवा कर ग्रामीण अर्थव्यवस्था को नई दिशा दी। इससे सैकड़ों किसानों को प्रेरणा मिली। कई किसानों ने अब खुद अपनी जमीन पर बागवानी शुरू की है।

## 3. किसान प्रशिक्षण कार्यक्रम 🧑🌾

अब तक 17,890 किसानों को आधुनिक खेती के गुर सिखाए गए। जैविक खेती का प्रशिक्षण।

## 4. ग्रामीण विकास और स्वरोजगार

संस्था ने 6,560 युवाओं और महिलाओं को स्वरोजगार के क्षेत्र में प्रशिक्षित किया।



हमारी संस्था पूरी निष्ठा और पारदर्शिता के साथ कार्य कर रही है। लेकिन बड़े लक्ष्यों को पाने के लिए हमें आपके सहयोग की आवश्यकता है। हम आशा करते हैं कि आपकी संस्था हमारे इस अभियान का हिस्सा बनेगी और समाज के उत्थान में अपनी भूमिका निभाएगी। “जय धरती मां फाउंडेशन” ने यह साबित किया है कि यदि नीयत साफ हो और इरादे मज़बूत हों, तो किसी भी स्तर पर बदलाव संभव है। पौधारोपण, किसानों का सशक्तिकरण, महिलाओं का आत्मनिर्भर बनना—ये सब हमारी मेहनत और समाज के सहयोग का परिणाम है।

हमें विश्वास है कि आने वाले वर्षों में आपके सहयोग से यह आंदोलन और भी मज़बूत होगा और हम अपनी धरती मां को और अधिक हरा-भरा, स्वस्थ और समृद्ध बना पाएंगे।

🙏 धन्यवाद। 🙏

जय धरती मां फाउंडेशन

धनबाद झारखंड

Email id -ravikumarnishadagriculture@gmail.com

YouTube channel -jai Dharti Maa Foundation

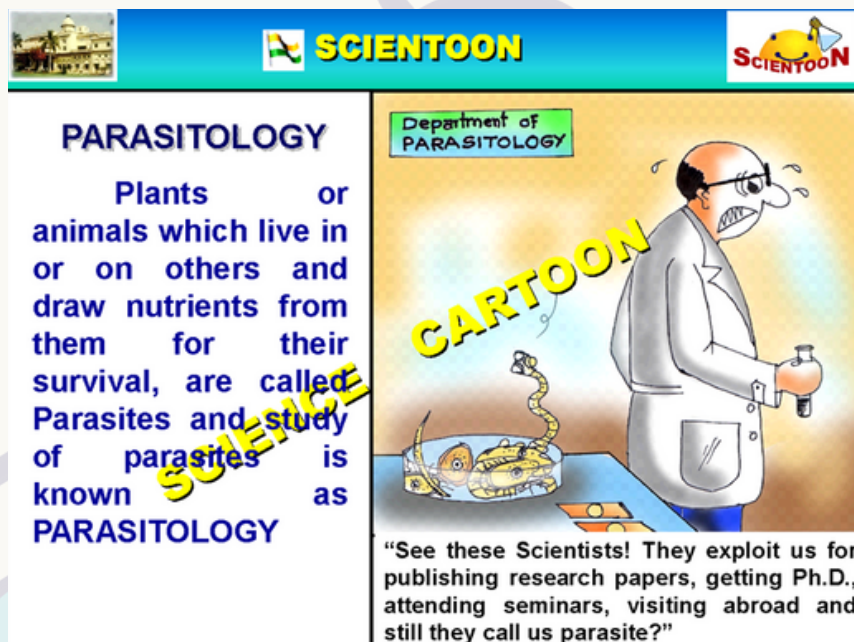


# SCITOOONS

## Science with Fun

**Dr. Pradeep Srivastava, Senior Scientist**  
**CSIR-CDRI, LUCKNOW**

Science education is a comprehensive term that refers to the study of the teaching and learning of science in all schools, colleges and universities. Topics in science education might include understanding how students learn science, how best to teach science, and how to improve learning outcomes by changing teaching methods and appropriate training of science instructors, within many modes, including classroom lectures, demonstrations, and laboratory activities.



It is well said that a picture is worth thousand words. Cartoons are the combination of caricature and satire. Caricature means distorted drawing and satire means a humorous comment. A cartoon is a form of two-dimensional visual art. While the specific definition has changed over time, modern usage refers to a drawing or painting intended for satire caricature, or humour to the artistic style of such works. An artist who creates cartoons is called a cartoonist. a simple drawing showing the features of its subjects in a humorously exaggerated way, esp. a satirical one in a newspaper or magazine

If the subject of the cartoon is science then they are called science cartoons. There are many good science cartoonist around the world. I was influenced by R.K. Laxman, a famous cartoonist in India who is also Raman Magsaysay award winner and Sydney Harris of USA. Sydney Harris is a wonderful science cartoonist and he also played a vital role in my life and in creation of scientoos.

As far I remember, drawing was a God gifted hobby to me. When I was a small kid, I used to draw anything in seconds. I remember one incident of class V, when I was studying in Govt. Model school in Rae Bareli, my home town, I made the drawing of Maharana Pratap (A great Indian Warrior) in Hindi (official language of India) exams. My teacher got very angry as he thought I must have spent a big time in drawing the sketch rather than attempting to answer the question. On asking the same I said that I have made that in 30 seconds. Teacher did not believe, so he said "I give you 10 minutes to make that drawing again, otherwise you will be severely beaten". I finished the same in 28 seconds, after that he got quite surprised and smiled.

I continued my drawing till B.Sc. as I was having biology as one of the subjects, but after joining M.Sc. (Organic Chemistry) I stopped drawing and almost I was totally out of touch. It was only in 1984, I made first cartoon of my life, which was published in a local daily "The Pioneer". The subject was a political issue. After that I developed interest and suddenly my old hobby was once again flourishing. My cartoons got published in other local dailies like DainikJagran, Sandhya Times, AnandbazarPatrika and magazines like Lotpot, Grihshobha, Kadambini, Sun and many more in India. I recall my first cartoons on science were published in Science Reporter, a popular science monthly magazine published by CSIR from New Delhi in India. Science Reporter published my science cartoons for several years and this gave me name, fame and honour. Actually, it was due to this encouragement only, that later on the idea of scientoon was evolved. I meet people who still remember many of my science cartoons published in Science Reporter years back which I can never forget. There was plenty of humour around me and I fully utilized that to convert into cartoons.

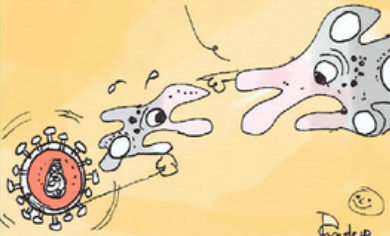
In 1988 while delivering a lecture entitled "Development of Drugs and Pharmaceutical Industry in Developing Countries" in an Asian conference held at National University of Singapore, Singapore. I used few science cartoons in order to make my lecture more informative, interesting and impactful. I coined a new name for such cartoons - SCIENTOONS. SCIENTOONS are the cartoons which are based on science, they not only make you smile and laugh but also provide information about new researches, subjects, data and concepts in a simple, understandable and interesting way.

- Scientoons / cartoons have been published by reputed International bodies:
  1. American Chemical Society, USA. (Chemtech)
  2. International Union of Biochemistry, UK. (TIBS)
  3. International Union of Pure & Applied Chemistry, Sweden.
- Royal Swedish Academy and Swedish National Committee on Science & Technology (which awards NOBEL PRIZE in chemistry) invited me to present a paper on the topic "SCIENTOONS" in the "32nd International Union of Pure and Applied Chemistry Congress" held at Stockholm, Sweden.
- World Health Organization has appreciated AIDS Education & Awareness to children through scientoons.
- United Nations Environment Programme (UNEP) has published report entitled "SCIENTOONS: Cartoons for Environmental Cause" in its Asia-Pacific News Letter.
- UNESCO, FRANCE has very much appreciated a original project based scientoons saying they could be useful to many sectors of UNESCO and showed interest to collaborate for exhibits, publications, training courses and seminars.
- Dechema, Germany, has invited me to deliver a lecture on the topic "SCIENTOONS - A Novel Tool to Create Environmental Awareness- A Key to Environment Mnagement in an International Congress of Chemical Engineering and Biotechnology" held in China.
- Council of Scientific & Industrial Research (CSIR), India -Developing scientoons on safety aspects of chemical, biological labs, industry and fire safety. Member, Editorial-cum-Organizing Committee of "SAFE-LAB", a publication on safety by CSIR, New Delhi, India.



- National Council of Science and Technology Communications (D. S. T, Govt. of India) took me in the expert panel as a resource person to conduct "Science Journalism Workshop" throughout the country.
- South African Pharmacology Society, South Africa along with International Union of Basic and Clinical Pharmacology (IUHAR) and International Council of Science (ICSU) Collaboration has proposed the use of scientoons for creating awareness about health care in Africa.

This Scientoon based audiovisual technique is more useful when a scientific program is undertaken for higher education/mass awareness on the subjects like environmental pollution, biodiversity conservation, Nanotechnology, DNA Technology and Human Genome, AIDS awareness, food and good health, Mass Spectrometry, disease like malaria, Hepatitis B, ascariasis, filaria, parasitic diseases and many other subjects and areas for communicating among the various experts of different disciplines. Scientoons can fill a gap among the various experts.

| SCIENTOON                                                                                                                                                                                                                                      |                                                                                                                                                                                                                  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>AIDS</b></p> <p>AIDS or Acquired Immune Deficiency Syndrome is caused by HIV (Human Immuno Deficiency Virus). More than 50 million people in the world have been affected by HIV/AIDS, The worst hit are Africa and South East Asia.</p> |  <p>"No! No! Throw him immediately. It is not a ball to play with, my son. It is the most dangerous HIV which causes AIDS"</p> |

| SCIENTOON                                                                                                                                                                                                        |                                                                                                                                                                                                                                                        |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>HIV/AIDS</b></p> <p>It is thought that HIV/AIDS started from a monkey virus, The first patient of AIDS was discovered in the year 1981 in USA.</p> <p>In India the first case reported was in Chennai.</p> |  <p>"See! Some are born lucky. Even at this young age He has achieved world wide attention, grande publicity and also providing jobs to many many scientists."</p> |

| SCIENTOON                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                            |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Every minute 50 acres of rain forests are cut in the world.</p> <p>Thus loss of rain forest per day is 72,000 acres.</p> <p>This is an alarming scenario which is responsible for causing Global warming.</p> |  <p>"Can you believe? Nobody had to move like us carrying oxygen cylinders in the year 2011. This miracle was possible due to this unique thing with a green top and brown base and people used to call it a tree."</p> |

| SCIENTOON                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                              |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>NANOBATTERIES OF THE FUTURE</b></p> <p>Researchers have painstakingly trapped metallic lithium inside carbonaceous nanostructures<sup>1</sup>. Such trapped lithium in carbon nanostructures could help make rechargeable nanobattery for next generation communication and remote sensing devices.</p> <p>In search of a better rechargeable battery, the researchers first produced a lithium precursor complex with dark violet colour slowly giving rise to gel-like mass. In the presence of dichloromethane, the gel-like mass decomposed to bimetallic complex containing both lithium and cobalt. Then using this bimetallic complex, they grew thin films in the absence of any reactive gas.</p> |  <p>"Can you believe? Nobody had to move like us carrying oxygen cylinders in the year 2011. This miracle was possible due to this unique thing with a green top and brown base and people used to call it a tree."</p> |

## Origin of Scientoonics

After delivering around 600 lectures in India and around the world covering more than 25 different topics of Science, I thought why not to name is a new science. Several names came to my mind but the best which I thought was Scientoonics. I delivered my 601<sup>st</sup> lecture in the "First African Science Communication Conference" held in the year 2006 at Dr Nelson Mandela Metropolitan University, Port Elizabeth, South Africa, where I announced for the first time about Scientoonics, in my lecture.

"Scientoonics is new branch of Science that deals with effective science communication by using a novel class of science cartoons called Scientoons."

**How to learn making scientoons:**

Cartooning is a creative art. One needs tremendous imagination in order to make the concepts simple and understandable. Humour and sarcasm constitute the important components of a cartoon. A cartoon like a poem is a compressed thought expressed elegantly and wittingly. In cartoons, not only humans but animals, birds, plants and fruits and even vegetable can also be made a character. Making and designing of scientoons needs a little skill of drawing, to understand how to draw the faces with different moods and expressions. One has to first understand the complex science subject in the simplest form, get the idea and then draw a cartoon, incorporate science part in that and thus a scientoon is generated. A 4-5 days workshop can be appropriate to make people learn how to create and design scientoons on various science subjects.

**Future of scientoons/scientoonics:**

Scientoons can play a vital role in making a common man understand the complex subject of science. Their greatest advantage is the visuals which speak a universal language, can be translated into any language of the world. In future these scientoons can be animated, can be allowed to speak and interact more closely with the children.

Scientoons have compelled governments/authorities in India to take certain steps for the betterment of the common man as they are very thought provoking and brain storming. Scientoons have made not only children but scientists, doctors, police officers, engineers, management experts, bank officers, railway officials, researchers and even people working for the government to understand the various issues related with the health, hygiene, environment, science education and work involving the community. Scientoons helped in making people aware and take preventive steps so also to save them from many diseases, take the balanced food, and give them better health. The major challenge today is to animate these scientoons so that they can create better impact among the masses. It would also then be possible to put voice in them according to the country they are being used. Puppet scientoon have also been created by the author with puppetry experts as puppetry is a very popular folk way of bringing science to common man in India. Dr Manoj Patra (India) suggested that Braille scientoon can be developed for the blind people





# FEATURED ARTICLE/INTERVIEW

Exclusive Interview with Experts



# THE MAN WHO FLIES WITH BUTTERFLIES

## "A Conversation with Butterfly Man of Jharkhand"

**Er. Prabhat Kumar, Jharkhand**



Welcome, everyone, to a very special session. Today, we have the immense honor of speaking with a man who embodies the beautiful transformation of a career into a calling—a journey from a high-ranking professional in the corporate world to a dedicated champion of nature. He is none other than Er. Prabhat Kumar, the former Chief General Manager of Environment and Civil, but more affectionately known to us as the "Butterfly Man of Jharkhand."

Er. Prabhat Kumar's more than two decades of dedicated work on butterfly biodiversity is not just a hobby; it's a testament to his profound love for nature. He has spent countless hours documenting, studying, and protecting the delicate winged wonders that grace the rich ecosystems of Jharkhand. His work reminds us that true passion knows no boundaries, and that each of us has the potential to make a significant impact on the world around us.

**Dr. Kamal Kant Patra:** Respected Sir, thank you so much for being here with us today. It is a true privilege. You've had a long and distinguished career.

On behalf of the School of Science, I would like to request that you share your experiences through the September 2025 edition of the School of Science's newsletter (VISIONA), so that they can reach all students and mass public. This will help us, together, preserve and protect the rich environment of Jharkhand for a safer and more sustainable future. In this regard, I have a few questions, and I kindly request that you provide your responses to them, which we can then publish in the September-2025 edition of our newsletter.



## Section-01: Understanding His Journey & Motivation

**Dr. Kamal Kant Patra:** Could you tell us about your journey from a Chief General Manager to becoming known as the "Butterfly Man of Jharkhand"? What sparked your initial interest in butterflies?

**Er. Prabhat Kumar:** Thank you, Dr. Patra, for that kind introduction. My journey is not just a story of a career change, but a return to a deep-seated connection with nature. For over two decades, my life was defined by my work as a Chief General Manager, a role focused on civil and environmental projects. While I was engaged in large-scale human endeavours, I always felt a part of me was missing something- a connection to the wild, untouched beauty of the world.

The transition from a boardroom to the forest was gradual but profound. It was sparked by a simple curiosity during my morning walks. I began noticing the incredible diversity of butterflies around me each a fleeting, vibrant masterpiece. It wasn't a single, dramatic event, but the cumulative effect of observing their intricate patterns, their delicate flight, and their fascinating life cycle. I was particularly captivated by the Blue Mormon, a spectacular butterfly I had the good fortune of spotting. Its sheer beauty and grace made me realize that even in our busy, modern lives, there is so much natural wonder to be found just outside our door.

My professional background in environmental science gave me the tools to understand their habitat and ecological needs, but it was my heart that drove me to document and protect them. This passion became a mission. I realized that these tiny creatures are not just beautiful; they are vital indicators of our environment's health. The "Butterfly Man of Jharkhand" is not just a title; it's a responsibility. It's about using the story of a butterfly to inspire people to protect the vast, interconnected web of life that we are all a part of. My hope is to show that a love for nature can be a powerful force for change, and that anyone, regardless of their profession, can find their true calling in serving the planet.

**Dr. Kamal Kant Patra:** What was a pivotal moment or a specific encounter with a butterfly that cemented your passion for their conservation?

**Er. Prabhat Kumar:** The pivotal moment was my first encounter with the Blue Mormon (*Papiliopolymnestor*). Its magnificent, iridescent blue wings and majestic flight were not just beautiful; they were a profound realization. This encounter cemented my belief that these delicate creatures are silent storytellers of our ecosystem's health. I felt an overwhelming responsibility to document and protect this fleeting beauty. That single butterfly transformed my curiosity into a lifelong mission for conservation.

**Dr. Kamal Kant Patra:** Throughout your over 20 years of experience, what has been the most significant change you've observed in Jharkhand's butterfly biodiversity?

**Er. Prabhat Kumar:** The most significant change I've observed is the alarming decline in the diversity and population of specific species, primarily due to habitat fragmentation and the loss of host plants. We're seeing fewer of the large, magnificent butterflies like the Common Nawab and the Great Eggfly, whose existence is deeply tied to native flora. This decline is a clear warning sign, reflecting the broader ecological imbalance caused by unchecked urbanization. It highlights a critical need for focused conservation efforts to protect both the butterflies and the specific plant species they depend on.

## Section-02: Butterflies and Biodiversity

**Dr. Kamal Kant Patra:** Why are butterflies considered crucial indicators of a healthy ecosystem? What can the presence or absence of certain species tell us about the environment?

**Er. Prabhat Kumar:** Butterflies are considered crucial bio-indicators because their life cycle is highly sensitive to environmental changes. The presence of a diverse butterfly population signifies a rich and stable ecosystem with a wide variety of plants and minimal pollution. Conversely, the disappearance of specific species, like the Jezebel or Common Tiger, often signals a decline in native flora or an increase in pesticide use. In essence, these delicate insects act as an early warning system, telling us if our environment is flourishing or in peril long before the effects become visible to humans.

**Dr. Kamal Kant Patra:** Could you elaborate on the relationship between butterflies and specific plant species in Jharkhand? Are there any unique co-dependent relationships you've discovered?

**Er. Prabhat Kumar:** The relationship between butterflies and plants is a beautiful, co-dependent dance; they are inseparable. Butterflies rely on specific plants, known as host plants, to lay their eggs on. For example, the iconic Blue Mormon lays its eggs on lemon plant family plants like citrus trees. The Common Mormon prefers lemon and curry leaves, while the Common Jezebel relies on Mistletoe plants. The caterpillars feed exclusively on these plants, making their survival directly dependent on their availability. This unique relationship makes butterfly conservation intrinsically linked to plant conservation, underscoring the delicate balance of our ecosystem.

## Section-03: Conservation & Public Awareness

**Dr. Kamal Kant Patra:** From your perspective, how can ordinary citizens contribute to butterfly conservation? What are some simple steps people can take in their own gardens or communities?

**Er. Prabhat Kumar:** The simplest and most impactful thing anyone can do is to create a small butterfly garden. This means planting native flowers that provide nectar for adult butterflies and host plants for their caterpillars. A great example is planting a curry leaf or lemon plant, which attracts the common Mormon butterfly. By avoiding pesticides and providing a small water source, we can turn our balconies or backyards into safe havens for these beautiful insects. This not only helps them survive but also brings a piece of nature's magic right to our doorstep.

**Dr. Kamal Kant Patra:** How can we engage students and young people in butterfly watching and conservation efforts to ensure the next generation cares about biodiversity?

**Er. Prabhat Kumar:** The key is to make it hands-on and exciting! We should start by organizing butterfly-watching clubs and bio-blitz events in schools and colleges, encouraging them to document local species. Introducing butterfly gardens on campuses allows them to witness the entire life cycle first-hand. By connecting them with nature through these beautiful creatures, we can inspire a sense of wonder and responsibility, turning passive observers into active protectors of our biodiversity.



**Dr. Kamal Kant Patra:** Could you share a success story of a butterfly conservation project you've been a part of in Jharkhand?

**Er. Prabhat Kumar:** One of our most heartening projects was a community initiative to restore a small patch of degraded land near Ranchi. We worked with local residents to plant a variety of native host and nectar plants. Within a year, we saw a remarkable increase in butterfly diversity, with new species like the Peacock Pansy and the Striped Tiger returning to the area. This project proved that even a small, collective effort can create a significant positive change, transforming a barren plot into a vibrant habitat for countless creatures.

## Section-04: Challenges & The Future

**Dr. Kamal Kant Patra:** With climate change, what are the potential impacts on Jharkhand's butterfly species, and what measures can be taken to mitigate these effects?

**Er. Prabhat Kumar:** Climate change poses a serious threat, altering the timing of seasons and directly impacting butterfly migration patterns and life cycles. Many species in Jharkhand are highly sensitive to temperature and rainfall, and these shifts can disrupt the availability of their specific host plants. To mitigate this, we need to focus on creating climate-resilient habitats, such as planting a wider variety of native plants to support species adaptation. It's about building an interconnected network of green spaces so they can find new homes as their current ones become unsuitable.

**Dr. Kamal Kant Patra:** Are there any specific butterfly species in Jharkhand that you believe are particularly vulnerable and need immediate attention for conservation?

**Er. Prabhat Kumar:** Yes, several species are facing high vulnerability. The Common Nawab and the Great Eggfly are two that come to mind. These large, magnificent butterflies require specific host plants that are rapidly disappearing due to deforestation and urbanization. Their declining numbers are a clear indicator of our habitat's degradation. By focusing our conservation efforts on protecting their specific habitats and food sources, we can safeguard not only these species but also the broader biodiversity they represent.

**Dr. Kamal Kant Patra:** Are there any specific butterfly species in Jharkhand that you believe are particularly vulnerable and need immediate attention for conservation?

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**Dr. Kamal Kant Patra:** Given your extensive experience, what advice would you give to aspiring naturalists or environmentalists in Jharkhand?

**Er. Prabhat Kumar:** My advice is simple: start with what's around you. You don't need to travel far to find nature; it's right in your own backyard. Observe the smallest creatures, like a butterfly or a beetle, and learn about their role in the ecosystem. Your passion and commitment can spark a ripple effect, inspiring others to act. Remember, every great naturalist started as a curious observer, and the first step to changing the world is to truly see it.

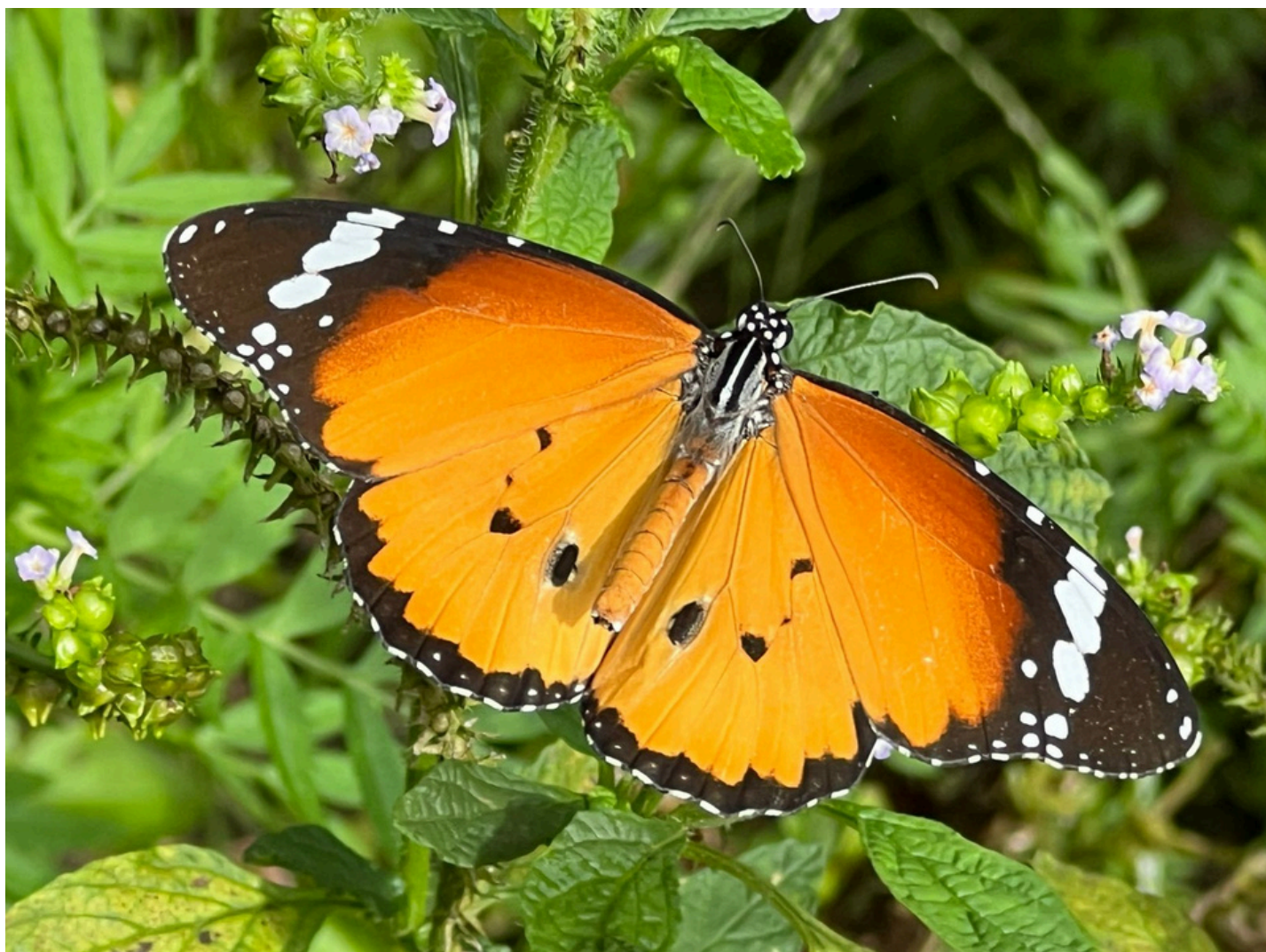
**Dr. Kamal Kant Patra:** As we conclude, what is your core message to the people of Jharkhand about their connection to nature and the role of butterflies in it?

**Er. Prabhat Kumar:** My core message is simple: we are all interconnected with nature. The fate of a tiny butterfly is directly linked to our own well-being. Each time we destroy a plant, we are taking away a home. Each time we use pesticides, we are poisoning a food source. Let the butterfly be a beautiful reminder of this delicate balance. By protecting these small, vibrant creatures, we are not just saving them; we are preserving the very essence of life for ourselves and for future generations.

**Dr. Kamal Kant Patra:** Thank you so much, Sir, for this incredibly insightful and inspiring conversation. The knowledge and wisdom you have shared with us today are invaluable. It is not just about butterflies; you have given us a profound lesson in the interconnectedness of all life. Your passion and dedication, born from a simple curiosity about these beautiful insects, have taught us that we all have a role to play in conservation.

The state of Jharkhand is truly indebted to you. In an era when we are grappling with serious environmental challenges, your work- blending scientific knowledge with the art of photography has brought the message of nature and biodiversity conservation to every home. You have shown us that even a simple love for butterflies can be a powerful force for change. We are grateful for your efforts and the legacy you are building for the people of Jharkhand.

Thank you once again for your time and for sharing your beautiful journey with us.

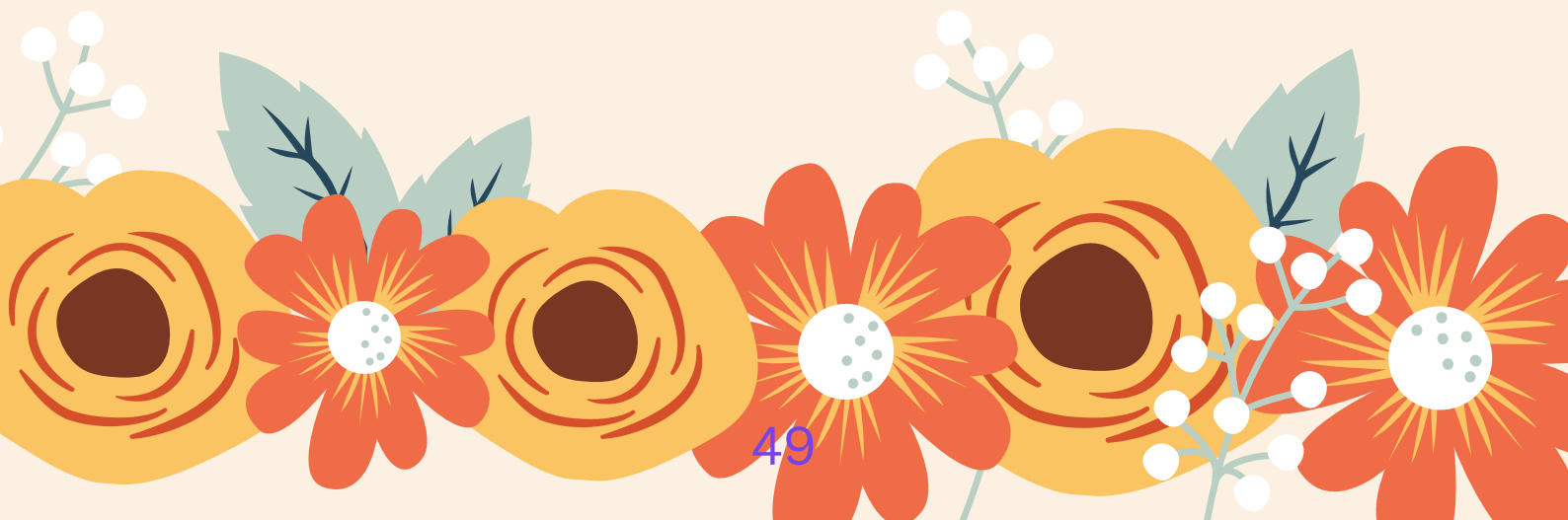




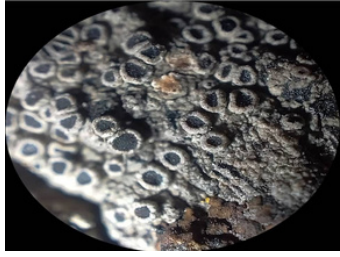


# *SCIENCE FOR SOCIETY*

POPULAR SCIENCE  
ARTICLE



# The Secret World of Lichens (शैवाक): Nature's Unsung Heroes



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## INTRODUCTION

While walking through Jharkhand's forests, you may notice colourful patches of green, gray, black, yellow, and orange on tree bark or rocks (Figure-01). These are lichens: sensitive organisms formed by a partnership between fungus and algae, and indicators of a healthy environment.

This article highlights their ecological importance and the threats they face. Despite Jharkhand's rich biodiversity, lichens remain overlooked. With rapid urban expansion and rising pollution, air quality declines, and these organisms begin to vanish: a silent warning of environmental stress.



Figure-01: Different patches of Lichens

This article aims to shed light on their importance, showing how they act as nature's pollution monitors and contribute to our ecosystem. We will explore how human activities are impacting their delicate existence and, more importantly, how each of us can take simple steps like planting native trees and reducing our carbon footprint to help conserve them. By protecting these small wonders, we are not just saving a species; we are actively safeguarding the health and beauty of Jharkhand for future generations.

## What Exactly are These Colourful Patches? A Tale of Two Partners

When you walk through the forests and hills of Jharkhand, you'll see them everywhere: splashes of green, gray, and fiery orange painted across rocks and tree trunks (Figure-02). These aren't just patches of moss or mold. They are lichens, and they represent one of nature's most remarkable and beautiful partnerships. Think of a lichen as a tiny, thriving city built by two very different residents.



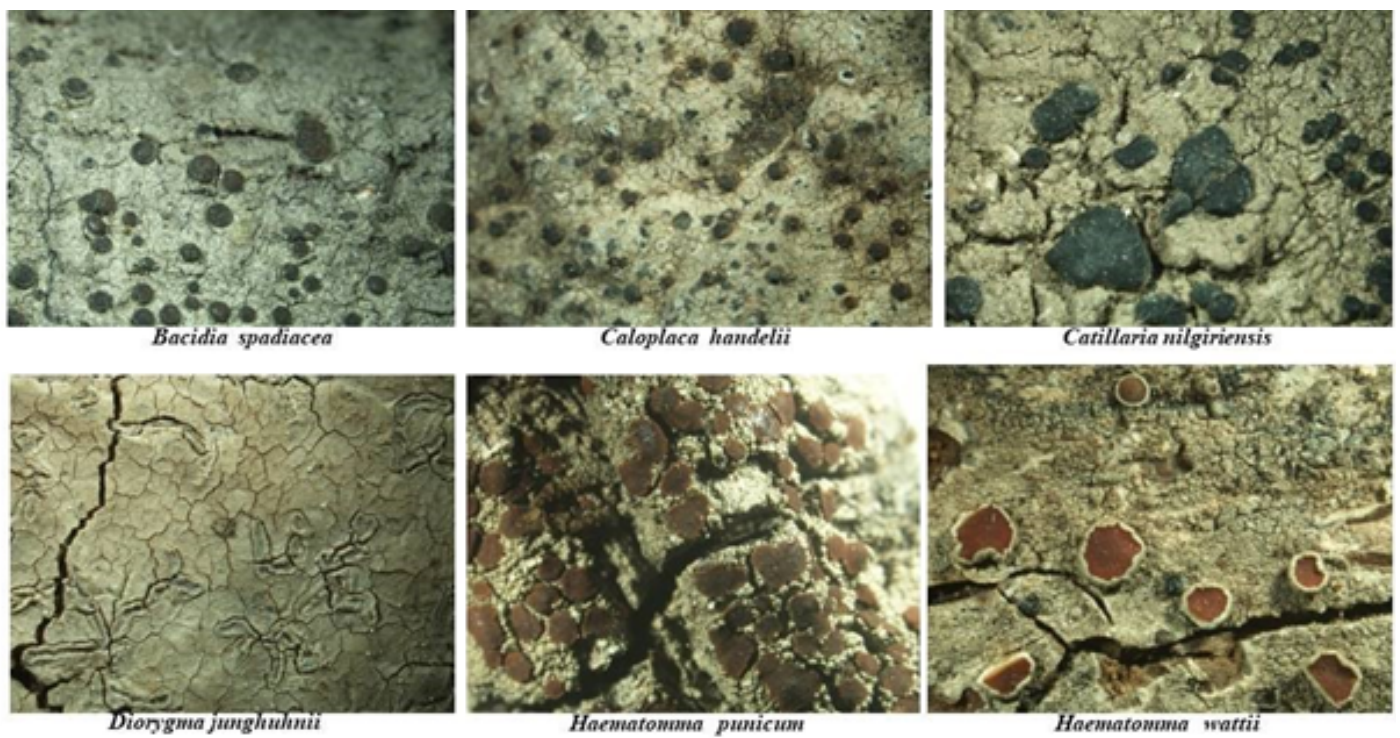


Figure-02: Lichen habitats

One of these residents is a fungus, which acts as the architect and protector. It builds the structure, or body, of the lichen, providing a safe home and a secure anchor to a tree or rock. It also absorbs water and minerals from the air and rain, much like a sponge. Its partner is a microscopic alga, which is like the food factory. Using sunlight, the alga produces food through photosynthesis, feeding both itself and its fungal partner. Neither could survive in such harsh places alone, but together they thrive, creating a resilient and beautiful organism that is a key part of our ecosystem. This teamwork allows them to colonize places where no other life can exist, making them true pioneers of nature.

### **Jharkhand's Living Thermometers: Lichens as Guardians of Clean Air**

In Jharkhand, the vibrant presence of lichens isn't just a beautiful sight; it's a living report on our air quality. Think of them as nature's own pollution monitors, silently and tirelessly telling us about the health of our environment. Lichens don't have roots like plants; instead, they absorb everything they need directly from the air and rain (Figure-03). This unique ability makes them incredibly sensitive to pollutants, especially a toxic gas called sulfur dioxide, which comes from vehicles and industries.

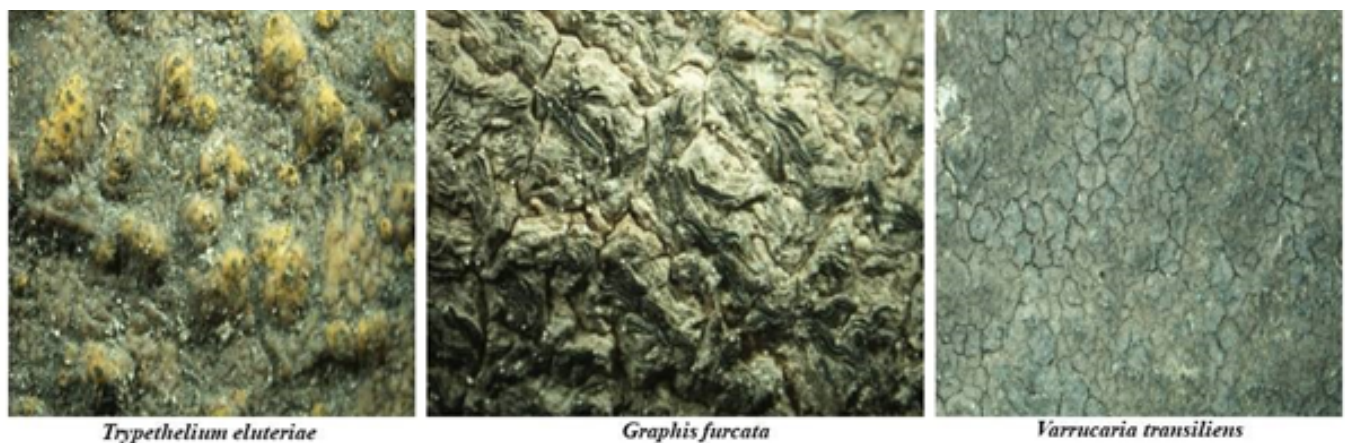


Figure-03: Lichen habitats



When the air is clean, as it is in many of Jharkhand's remote forests, you'll find a wide variety of lichens flourishing on rocks and trees. But as you move closer to cities or industrial areas, where the air becomes polluted, these lichens start to disappear. Their absence is a clear and undeniable warning sign that the air is no longer safe to breathe. This simple fact makes lichens powerful bio-indicators. By observing which species are present and which are missing, scientists and citizens alike can get a clear picture of local air quality without any expensive equipment. They are truly living thermometers, measuring the health of our atmosphere one colourful patch at a time.

### **The Silent Architects of Our Ecosystems**

Lichens may seem small and insignificant, but they are the silent architects of Jharkhand's ecosystems, working tirelessly behind the scenes to build the very foundation of our forests (Figure-04). They are what scientists call pioneer species, meaning they are among the first life forms to colonize a barren or rocky area. By producing a mild acid, lichens slowly dissolve the surface of rocks, breaking them down into tiny mineral particles. Over hundreds of years, these particles mix with decaying lichen matter and windblown dust, gradually creating a thin layer of soil. This newly formed soil is the building block for all life that follows, allowing mosses, ferns, and eventually larger plants to take root and thrive.



Figure-04: The Silent Architects of Ecosystems

But their role doesn't stop there. Lichens are also crucial for the survival of countless small insects and animals. The intricate, textured surfaces of lichens provide shelter for microscopic creatures and a food source for caterpillars and snails. This forms a vital link in the forest food chain, supporting a wide range of life. They also act like tiny sponges, absorbing water from rainfall and releasing it slowly, helping to regulate moisture in the environment and prevent erosion.

In short, lichens are a fundamental part of Jharkhand's biodiversity. They are not just living on our trees and rocks; they are actively creating and sustaining the environment around them. Without their quiet, persistent work, our forests would be less vibrant, less stable, and far less diverse. Their existence is a powerful reminder that every organism, no matter how small, plays a crucial role in maintaining the health and beauty of our natural world.



## **A Vanishing Beauty: How Human Actions are Hurting Lichens**

Lichens, though resilient in nature, are highly vulnerable to human impacts. In Jharkhand, rapid development is causing their quiet disappearance from trees and rocks—a tragedy directly linked to our changing environment.

Air pollution is the leading threat. Lichens absorb everything from the air, including harmful chemicals like sulfur dioxide from factories and vehicles. Unlike plants, they cannot shed pollutants, so toxins build up until entire populations vanish—an unmistakable sign of worsening air quality.

Urbanization and deforestation add to the damage. Expanding cities clear forests and destroy the shaded, moist habitats lichens need, replacing them with barren concrete landscapes where survival is impossible.

Agricultural chemicals further accelerate the decline. Pesticides and herbicides drift through the air, damaging lichens' fragile structures and disrupting the vital partnership between fungus and algae.

Together, these pressures are pushing lichens toward disappearance. Their loss is not just ecological—it is a silent warning that human actions are endangering the health and beauty of our environment.

## **Our Role as Caretakers: Simple Steps to Protect Lichens**

Our Role as Caretakers: Simple Steps to Protect Lichens

Lichens are vital to Jharkhand's environment, and protecting them does not require being a scientist or activist. Simple everyday actions can make a big difference.

The most important step is reducing air pollution. Walking, cycling, using public transport, and supporting clean energy initiatives all help cut emissions that harm lichens. Each small effort is a breath of fresh air for both us and them.

We must also protect their habitats. Planting native trees and shrubs creates natural homes for lichens, while avoiding scraping or removing them in forests and parks preserves these slow-growing organisms.

Finally, spreading awareness is key. By sharing the story of lichens and their role in our ecosystem, we can inspire others to see them not as mere patches of colour, but as vital symbols of environmental health. In becoming their voice, we strengthen our collective role as caretakers of Jharkhand's natural heritage

# Popularizing Millets with their multiple Value-added Products



**Dr. Asha Mishra**  
**Dean, School of Science**  
**YBN University**



Millets may be the first cereal grain utilised for domestic purposes and are among the oldest food grains known to humankind. Almost one-third of the world's population relies on millets as part of their basic diet, and millets have long been a cherished crop in India.

They are able to adapt to a variety of environmental factors, including poor soils. Tiny millets include kodo millet (*Paspalumscrobiculatum*), little millet (*Panicum sumatrense*), foxtail millet (*Setaria italic*), proso millet (*Panicum miliaceum*), and barnyard millet in addition to finger millet (*Eleusinecoracana*) (*Echinochloafrumentaceae*).

The hulled and pearled varieties of millets are the most widely accessible. Millets are pleasant grains with a flavour reminiscent of nuts and slight sweetness. When compared to rice, millets are richer suppliers of minerals, calories, dietary fibre, and protein.

The lack of standardised processing methods to compete with fine cereals has resulted in a reduction in the consumption of these millets, despite their great food value and variety. Hence, an effort was made to promote the use of small millets in meals that were already widely accepted under the label of "Health Foods."

The development and standardisation of small millet-based value-added products, such as traditional recipes, bakery goods, pasta goods, flaked and popped goods, and quick food mixes, took place. Little millets were used instead of the cereals that farmers typically used to create products in order to enhance their use.

## Traditional recipes

- Snacks: Vadai, Pakoda, Ribbon pakoda, Omapodi, Murukku, Thattuvadai, Hot kolukattai and Vadagam.
- Breakfast food: Idli, Dosa, Idiappam, Rotti, Pittu, Upma, Adai, Porridge, Khakra, Paniyaram and Chappathi.
- Sweets: Halwa, sweat kolukattai, Adhirasam, Kesari, Nutritious ball and Kheer.

## Bakery products

People of all ages are affectionate of different bakery products, because of their taste, colour and easy to digest nature. Celebrating any moment of happiness is incomplete with bakery products. Bakery products are becoming prominent day by day. Nowadays individuals have virtually no time to invest much on making breakfast it is the bread and bun or biscuits which had occurred instead of other sorts of stuff. They are good supply of snacks and therefore are broadly available. Small millets were incorporated in different variations from 10% to 50% levels to standardize bread (20%), cake (30%), cookies (50%), soup sticks (20%) and khari (40%) replacing refined wheat flour.



### **Pasta products**

Pasta meals like vermicelli, noodles, macaroni etc., are commonly liked by children of today's generation and by other age groups for their taste, inexpensive and easy method of preparation. Pasta is a perfect foundation for healthy, nutritious and satisfying meals, generally eaten with nutrient-dense food partners, such as fiber-filled vegetables and beans, heart healthy fish and monounsaturated oils, antioxidant-rich tomato sauce and protein-packed cheeses, egg, poultry and lean meats. For small millets to be competitive with important cereal foods, pre-processed or alternative millet-based foods are required. Vermicelli, noodles Macaroni were prepared from refined wheat flour and blending with small millets at 30% incorporation levels.

### **Flaked and Popped products**

Cereal popped products and flakes are popular breakfast foods and at present they are mostly made from corn. By suitable processing it might be feasible to produce popped foods and flakes from millets. These Ready-To-Eat products are very popular, being crisp and friable in texture. The relatively smaller size and quick hydration of millets make them most suitable for the production of flakes and popped products. Small millets were flaked and popped and a variety of recipes were standardized.

Value added products from small millet flakes - avaluppma, kitchadi, payasam, masala flakes, boli, sweet balls, lemon bath, tamarind bath and tomato bath. Value added products from popped small millets - uppma, bhelpoori, masala corn, cheeian.

### **Instant Food Mixes**

In the modern days where the life is at fast pace with the time very valuable to every person, "Instant Foods" play an important role in everyone's day-to-day life. The very term 'instant food' means simple, fast and convenient food which is easy and fast to prepare besides being hygienic, free from microbial contamination and also convenient to eat. Unlike olden days where man used to have his food lavishly and slowly, the present trend changed the habits to foods which are simple and easy to digest. Hence, the existence of these foods fulfilled all the needs of modern human being. Traditional East Indian (specially Jharkhand & Bihar) breakfast foods viz., Dushka, Dudhauri, momo, roti, multi-grain litti, dal pitha, arsa, DunguPeetha, and ChilkaRotis were selected. Instant mixes of these traditional products with the incorporation of small millets were standardized.

# Eclipses and Superstitions



**Dr. Dhruv Kumar Singh**  
**Assistant Professor, Department of Mathematics**  
**School of Science, YBN University, Ranchi**



In the midst of a scorching bright day, when the Sun is at its highest, suddenly the brightness begins to fade and dusk starts falling on the land. The air gets cold and a sense of stillness fills the atmosphere and suddenly, in an instant, everything goes dark. You look up at the Sun, and it appears like a black disk. This is exactly what happens during a total solar eclipse, when at totality the Moon completely covers the Sun. For someone witnessing a total solar eclipse for the first time, it can be really frightening. Mention of eclipses is found in almost all mythologies and literature of all ages and genres around the world. And most often they are projected as an embodiment of fear, terror and most precisely, collapse of the natural order of things. Delving into the etymology of the Greek word “Eclipse”, it means abandonment, which gets translated to the Sun abandoning the Earth. The embodiment of the eclipse turns out to be frog in Vietnamese, dragon in Chinese, dog in Korean, bear in American, and Rahu-a beheaded demonic figure that engulfs the Sun or the Moon in Indian mythology. Since the explanation of eclipses was not known in ancient times, most cultures believed that some demon or animal was trying to devour the obscured object. The fear related to eclipses seems to be arising out of the natural instincts of humans. For many civilisations and cultures around the world, the Sun is the supreme life-giver-an inextinguishable source of light and life; anything that goes against this belief and is not under control of humans is seen as a terrible event or as an omen. Coincidental occurrences of some unfortunate events like death of King Henry in England in 1133 and the spread of Black death (caused due to bacillus Yersinia pestis) in Europe in 1345 had left the earthlings with no option but to believe in the apocalyptic power of eclipses.

For over 500 years, a recurring theme of the eclipse-related stories popular in many cultures was of a ‘scientific’ man taking advantage of the superstitious fear of the local people to manipulate them. In one of the most common versions of such stories, Christopher Columbus and his crew on their voyage attempt to terrify the local people of Jamaica with his godly powers to make the Moon disappear, unless they provided them with the food and supplies. As a sea voyager and an expert in reading sky-maps, Columbus was aware of a total lunar eclipse happening on 1 March 1504 and its exact time and duration. So, he could precisely predict when the Moon goes into the Earth’s shadow.

An eclipse is a natural phenomenon involving the celestial bodies; however, there are many myths across many cultures about eclipses. In India, the description of eclipse is found in one of the oldest scriptures, the Rig Veda, which dates back to 1500BC, where the cause of eclipse or grahanam is attributed to a demon, named Svarbhanu, who trapped the Sun and made the Sun disappear, making the whole earth dark. This caused havoc among the gods and humans. The gods appealed to the Rishi Atri who was able to establish the eye of Surya in heaven once again and caused the magic of Svarbhanu to vanish, thus rescuing the Sun. Rishi Atri explained that a solar eclipse occurs when Svarbhanu (the Moon) comes between the Sun and the Earth.



The Puranas describe the story of Rahu, Ketu in a mystical way. It mentions Rahu devouring the Sun or the Moon and their escaping through his disconnected neck. As the geometry of Sun, Earth and Moon became clearer to the people and Indian astronomy adopted mathematical models of the motion of the heavenly bodies, Rahu and Ketu came to be associated with what are commonly known as eclipse nodes or the points where path of the Moon crosses the path of the Sun. The nodes are invisible, and so are the demons; the nodes change position in the sky, as the demons are pictured to do. It became possible by the astronomers to predict occurrence of the eclipses by tracking the movement of the nodes.

It is believed in India that eclipses occur when the Sun or the Moon is devoured by Rahu or Ketu and hence eclipses are considered as bad omens and get identified with traditional beliefs and superstitions. In AD 500, in India, Aryabhatta was the first to explain scientifically how lunar and solar eclipses occur, disregarding Rahu and Ketu. In the final section titled 'Gola' in his work Aryabhatiyam, he mentions that the Moon and the planets are visible by the reflected light of the Sun and the eclipses occur due to the shadows of one celestial object falling on the other. Aryabhata additionally gave numerical methods to make calculations about the duration of eclipses which were further refined by subsequent Indian scholars. These calculations were more precise than the techniques used by Europeans until the late 18th century as substantiated by French Astronomer Guilleme De Gentil in 1765.

#### Misleading interpretations

What concerns most scientists and science communicators are the misleading interpretations of these natural events. For almost all the cultures, everything goes out of balance with the universe during an eclipse and strange practices have been suggested to escape the wrath of eclipses. The extremes of such behaviours have led to the restrictions on activities that include refraining from eating, drinking and cooking during an eclipse and not witnessing these rare moments of the cosmos. Unfortunately, most of these myths and superstitions are engraved in our minds. Here we try to debunk some of the popular myths and superstitions related to eclipses with the possible scientific explanations.

The most common misconception is that harmful radiations are emitted from the Sun during an eclipse, which is not based on scientific facts. As we know, the Earth constantly receives high-energy particles coming from the Sun in the form of light and heat that is essential for life to exist. A solar eclipse occurs when the Moon moves in front of the Sun as viewed from Earth, blocking the Sun's light and the shadow of the Moon falls on the Earth. Therefore, there is no change of emission pattern released from the surface of the Sun during an eclipse.

The fear related to eclipses seems to be arising out of the natural instincts of humans. For many civilisations and cultures around the world, the Sun is the supreme life giver-an inextinguishable source of light and life; anything that goes against this belief and is not under control of humans is seen as a terrible event or as an omen.

A lunar eclipse occurs when the Earth's shadow falls on the Moon. During a lunar eclipse, the Earth is located between the Moon and the Sun thereby blocking the Sun's light from reaching the Moon. Since the reflected light from the eclipsed Moon is negligible as compared to the light of the Sun, there is no danger in watching a lunar eclipse with naked eye.

Another common misconception is that watching a solar eclipse can cause permanent blindness. This is only partly true because, looking at the Sun directly is harmful regardless of whether there is an eclipse or not. Scientists have studied the radiations from the Sun and stated that direct viewing of the solar eclipse without eye protection could result in blindness. However, during a total solar eclipse, it is safe to watch with the naked eye only during totality, when the Sun is fully blocked. During totality, when the Moon's disc completely covers the Sun, only the Sun's corona emits electromagnetic radiation. This radiation from Sun being so faint cannot cause blindness. However, it is advised not to look at the Sun before or after totality with naked eye because it can cause damage to the retina.

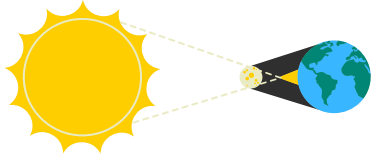
The restrictions on eating and drinking during eclipses have been ascribed to the supposed poisoning of food during an eclipse. The process of cooked food going bad within some hours is a natural and common event that we experience daily. But there is no real science to support the belief that food gets spoiled during an eclipse.

Another persistent belief in this modern age is that of solar eclipse causing birth defects in unborn foetuses or miscarriages in pregnant women. The belief also traces its origin to some unfortunate events and stories of the past. The suddenness of the darkness that descends at totality can be frightening enough to cause a pregnant woman to abort; therefore, there is no scientific evidence that eclipses per se harm pregnant women or their unborn babies.

Scientists have stated that there is no scientific basis behind these myths and superstitions and that eclipses have no harmful effects on us. The government and many scientific organisations, engaged with science popularisation activities including academic, research establishment and different divisions as Vigyan Prasar have encouraged people to come out and witness the magnificent natural phenomenon using certified filters and eclipse glasses.



# Solar eclipse, navigational tables & colonialism



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The practical aims of geography, to determine the latitude and longitude of a location, navigation, and to improve the accuracy of the moon tables, gave impetus to solar eclipse observations during the eighteenth century. São Gabriel, the flagship of Vasco da Gama's armada, commanded by Nicolau Coelho, gently entered the river Tagus, the longest river on the Iberian Peninsula in southwestern Europe, occupied by Spain and Portugal, on 12 July 1499.

The news electrified the whole of Europe; the Portuguese had finally reached India by sea. European merchants, Nobles and Kings danced with joy. Since the conquest of the Constantinople, in 1453, a city that connected the Europe and Asia-Minor, by the Ottomans, European traders were in search of a sea route to Asia, in particular to India. The Ottomans levied very high trade taxes on the European transit goods passing through their land. Since this feat, Vasco da Gama was hailed as a hero in the European imagination. The daring voyage, in search of spices and silk, had commenced on 8 July 1497 with 170 sailors and a fleet of four ships. It went around the African continent and finally reached Kozhikode (Calicut) on 20 May 1498. The incident spurred what is celebrated in European history as the 'age of voyages', which lasted until the 17th century. The period is marked by the European exploration of the world by sea in search of new trading routes, wealth, and knowledge. Ships sailing to the Americas, distant Australia, islands of Caribbean, just dots and blobs on the world map, became a routine affair.

## Not getting lost

The perils of sailing in the seven seas included storms, hurricanes, typhoon, pirates, attack by rival kingdoms and occasional mutiny by the sailors against tyrant captain of the fleet. But nothing was a more significant challenge than to calculate latitude and longitude of the ship. Knowing your place in the high seas often meant life or death. Moreover, when a new island was found and a natural port was discovered in distant lands, they needed to be marked on the world map. To leave a permanent mark in the world map, the latitude and longitude of the place needed to be computed. Knowing your latitude and longitude was a paramount stumbling block. However, finding the latitude was relatively easy. The altitude of North Star (Pole Star) above the horizon readily gives your latitude. During daytime, or if the ship is in the southern hemisphere, the Pole Star is of no use. However, by measuring the altitude and azimuth of a known bright star (or the Sun), whose RA (right ascension) and Dec (declination) is precisely known, local sidereal time, and with a bit of spherical trigonometry, one can determine one's latitude. Tables provided in the Nautical Almanac can help in computing the latitude. By 1700, finding latitude at sea was routine and reasonably accurate.

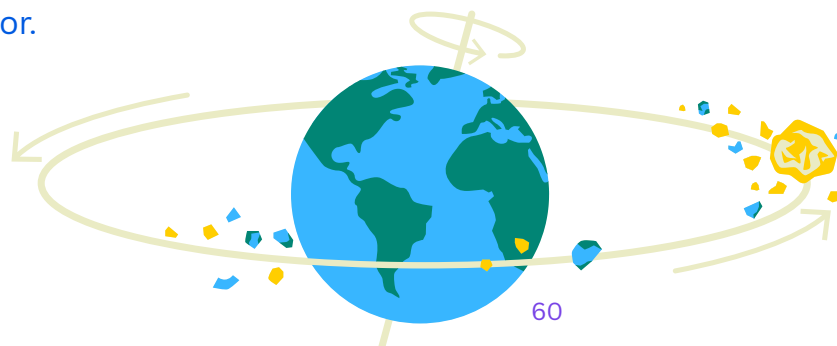
## The longitude problem

Computing the longitude however was more difficult. The sailors often had to resort to dead reckoning, a process in which the current position was determined using a previously known location of the ship, say when it was in the port of call and using the estimated speeds over elapsed time and course to guess its current position on a navigational chart. This method was subject to cumulative errors, and often the sailors reached a totally different place than intended. Meandering in the seas, the ships took longer than the necessary time to reach their destinations. With the sea voyages extending beyond the initial estimates, the food stocks ran low, the crew were fed with short rations, leading to various deficiency diseases like scurvy.

Navigation relying on dead reckoning at times wrecked the fleet and left the sailors dead. A famous case is the squadron of British Royal Navy ships that were returning from Gibraltar in October 1707. The weather was overcast and stormy. The navigators of the fleet estimated that they were sailing near the island of Ushant off Brittany in France, while actually, they were near the Isles of Scilly, off the coast of Cornwall, UK. Later that night four ships rammed into the rocks near the Scilly Islands and thousands of sailors lost their lives at sea. It was one of the worst maritime disasters in British history of that time. The public furore forced the British government to enact the Longitude Act of 1714. Rewards were instituted for anyone coming up with a viable solution to the problem of finding longitude at sea.

## Greenwich Time

If the British announced the Longitude Prize "for such person or persons as shall discover the Longitude" and demonstration of a practical method for determining the longitude of a ship at sea, other seafaring European nations did not lag behind. Académie Royale des Sciences of France offered two Prix Rouillés specifically for navigation from 1715 onward. Spain and Holland also joined the fray. Navigators and scientists proposed various methods. It is easy to see that if the time at Greenwich (which was used as the standard reference point) was, say noon, a place 15 degrees longitude west of Greenwich will have a local time of 11 am. A position 15 degrees east of Greenwich will have a local time of 1 pm. In short, the relation between local time and Greenwich Time will be 15 degrees longitude for an hour of difference. If the captain could determine the local time and can compare it with Greenwich Time, the longitude of the location of the ship could be easily computed. Each hour of difference between the Greenwich time and the local time imply 15 degrees of longitude. Finding local time is not a complication. The sundial or a star at the horizon would provide the local time. Thus, the question of finding the longitude reduces to finding the time at Greenwich. This can be done in two ways. One, you can carry a seaworthy clock that is set to Greenwich Time. The marine chronometer invented by John Harrison relied on this method. Second, you one rotation in 12 hours. With the background stars along the ecliptic serving as the numbers on the dial to read the time and the motion of the Moon as the rotating hands of the clock, one can determine the time at that instant. As the motion of Moon is predicable to very high accuracy, one can publish a table which pairs the time, in terms of Greenwich Mean Time, with the angular distance of the Moon and a celestial reference object. When the navigator wants to find the longitude, he uses a sextant to measure the angular distance between the Moon and a celestial reference object, at that instance. The almanac tables give geocentric lunar distances. The lunar distance is nothing but the angular distance between the Moon and a reference object, as they would appear from the centre of the Earth. Further, depending upon the altitude of the Moon and the reference object, atmospheric refraction would also mar the observation. Therefore, the observed lunar distance has to be corrected for the effects of atmospheric refraction and parallax to obtain correct lunar distance. The navigator then consults the tables to find out at which Greenwich Time the Moon and that reference object would have the observed angular distance. Voila! They have found the Greenwich Time. Now it is only the question of finding the local time and computing the difference in local and Greenwich Time. You have found the longitude of your location, within a few kilometres of error.





## The Nautical Almanac

The idea was first proposed by Tobias Mayer, the German astronomer and superintendent of the observatory at Göttingen in 1755 to British board of longitude. James Bradley, the Astronomer Royal at that time found the tables to be accurate within half a degree, but this required involved calculation and was time-consuming. A significant impediment to practically adopting this method was the mathematics involved in determining time and longitude by lunar distance that remained beyond the grasp of most seafarers. Nevil Maskelyne, who in 1765 was appointed as Astronomer Royal, found a solution. Why not publish detailed tables and simple formulas. The navigators would need to only plug in the observed measurement, such as the altitude of the Moon and reference object as well as the angular distance. With simple arithmetical computation, one could obtain the longitude. Using the Mayer's tables as the starting point, Maskelyne commenced the publication of the Nautical Almanac since 1767 from the Royal Greenwich Observatory. Thirty-five human computers, including a sole woman, Mary Edwards, were employed between 1765 and 1811 by the Royal Observatory for the computation of the tables.

In its heydays, the tabulated distances in the Nautical Almanac were given at three-hour intervals for various reference celestial bodies. The Sun, the planets like Mars, Venus and Jupiter, bright stars like Sirius, Aldebaran, Altair, Antares, Fomalhaut, Hamal, Markab, Pollux, Procyon, Betelgeuse, Rigel, Regulus, and Spica were some of the significant reference objects for which the lunar distance was pre-computed and published as tables. Soon the Greenwich Mean Time became the standard. Prominent European voyagers, including James Cook, used the lunar distance method and the Nautical Almanac for their explorations.

## Finding accuracy

With life and property at the mercy of the almanac tables, it is natural that the astronomers and navigators wanted to verify and ensure the accuracy of these predicted positions of the Moon, planets and the Sun in the celestial sphere. What else but the eclipses of the Sun provide an opportunity to verify the expected location with the actual observation of the Sun and the Moon in the sky. The timings of the first and last contact during an eclipse provided the exact position of the Moon and hence to derive corrections for its ephemeris. One could compare various tables to see which one is closer to the observed value. Initially, the observations were made simply by watching the Moon make the first or last indentation on the Sun's limb. The scintillation on the Sun's limbs and the irregularities of the Moon's contour made the precise timing of these events difficult. With the arrival of the micrometer screw gauge for the measurement of the cusp provided a way out. Francis Baily, an English astronomer and president of Royal Astronomical Society asserted, "...in eclipses of the Sun, the measurement of the distances of the solar cusps affords one of the best means of determining the beginning and end of the eclipse". Astronomers measured the angular distance of the chord between the cusps (or horns) during the partial phase of the eclipse to interpolate the contact timings.

## Solar eclipse observations

Astronomers were often extolled to take up the telescope, observe and provide precise details on the contact timings. Measuring the distance of the cusp formed the standard protocol during the late 18th century and early 19th century solar eclipse observations. Rev. Professor Powell of the British Association for the Advancement of Science, Oxford while drawing up a memoir for observing the Annular Eclipse of 9 October 1847, suggested to the observers that the "principal object must be to make several measures of the distance between the cusps about the time when that distance is smallest".

# An introduction to X-Ray Crystallography



**Dr. Sarika Verma**  
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Crystallography deals with the laws governing the crystalline state of solid materials, arrangement of atoms in crystals, and their physical and chemical properties, synthesis and their growth. The heart of crystallography lies within a crystal. Crystals play an important role in different fields such as mineralogy, inorganic, organic and physical chemistry, physics, metallurgy, materials science, geology, geophysics, biology and medicine. Since the wavelengths of X-rays and the lattice parameters of crystals are of the same order of magnitude, X-rays are diffracted by crystal. Utilizing this effect, a new era of modern crystallography was started by, Max von Laue in 1921, which made it possible to determine the structures of crystals. In many countries, especially in Germany, crystallography is mainly taught as a part of mineralogy, while in Britain and North America, it is more often taught as a part of physics or chemistry.

Crystal structure can be determined utilizing Bragg's equation or Bragg's law. The equation is as follows:

$$n\lambda = 2d \sin\theta$$

where  $\lambda$  is the wavelength of the X-rays,  $d$  is the spacing between atomic planes in a crystal,  $\theta$  is the angle of incidence (also known as the Bragg angle), and  $n$  is a positive integer representing the order of the diffraction. This law describes the constructive interference of X-rays diffracted by crystal lattices, allowing for the determination of crystal structures.

The pervasiveness can be understood when the widespread boundaries of crystals are known. It can be found in all naturally occurring solids, e.g. minerals and the ores etc. A mountain crag normally is made up of crystals of different kinds, while an iceberg is made up of many small ice crystals. Virtually all solid inorganic chemicals are crystalline, and many solid organic compounds are made up of crystals, among them benzene, naphthalene, polysaccharides, proteins, vitamins, rubber and nylon are most common.

Metals and alloys, ceramics and building materials are all made up of crystals. The inorganic part of teeth and bones is crystalline. Hardening of the arteries and arthritis in humans and animals can be traced to crystal formation. Even many viruses are crystalline.

Chemical crystallography is the application of diffraction techniques to the study of structural chemistry. It is based on the phenomenon of X-ray (or neutron) diffraction. It determines the crystal structure and thereby the molecular or ionic structure of materials in order to illuminate aspects of their chemistry and function. The range of materials which is studied comfortably includes simple metal salts and large molecules containing many hundreds of atoms. The subject is concerned with crystalline materials and hence excludes the amorphous and glassy states, as well as plastic crystals, liquid crystals and quasi-crystals.



Viruses, proteins, DNA and other large molecules which fall under the remit of macromolecular or polymer science are excluded. A frequent purpose is the identification of natural products, or of the products of synthetic chemistry experiments. It can also be applied to study molecular geometry, intermolecular interactions and absolute configuration. Structures can be studied as a function of temperature, pressure or the application of electromagnetic radiation and magnetic or electric fields. Majority of structure analyses are routine. Some crystal quality can appear as weak diffraction, disordered atoms, twinning or large regions of diffuse solvent. These difficulties can be at least partially overcome by employing more powerful radiation sources. Because the extent of diffraction depends on the number of electrons an atom has, identifying the positions of hydrogen atoms using X-ray diffraction can be problematic, as can distinguishing atoms with similar atomic numbers. In addition to their inherent information content in terms of identification and geometric characterization, the results also provide the necessary input for various types of calculation and modeling such as ab initio molecular orbital calculations and protein docking studies. The results of chemical crystallography are indispensable throughout chemical research, but are of particular significance in certain research-intensive industrial sectors, for example those involving pharmaceuticals, microporous materials and optical, electronic and magnetic materials. They also contribute to many aspects of life sciences, including pharmaceutical research, drug processing and the study of life under extreme conditions.

Although the majority of studies involve routine procedures using standard instrumentation, chemical crystallography is not limited to a particular experimental technique. The type, intensity and wavelength of radiation can vary, like temperature and pressure. Somehow, all nonroutine experiments utilize apparatus which is recognizable as a modification or close analogue of either a single crystal or a powder diffractometer. Powder methods for structure determination are advancing rapidly and are often the only viable technique when sufficiently large single crystals are not available. The Cambridge Structural Database (CSD), the main repository of chemical structure results, comprises 541,748 organic and organometallic crystal structures (1<sup>st</sup> January 2011), listed only 2003 structures as having been determined by powder diffraction methods. One characteristic of chemical crystallography experiments is that diffraction data are collected to atomic resolution. An experiment will generally involve the determination, geometric description, analysis and comparison of the arrangement of atoms in crystals of chemical compounds. The stereotypical experiment involves the determination of a crystal structure of a novel reaction product in order to characterize it in terms of the elements present and their relative disposition. This provides a form of chemical analysis, establishes the connectivity, and yields values for geometric parameters including bonded distances, valence angles and torsion angles. A chemical crystallographic study may also have more specific objectives such as identification of which tautomer of a molecule, determining the relative or absolute configuration of a molecule, or delineating the geometry and mode of extension for an extended structure. The results of chemical crystallographic investigations are applied to diverse areas, including structural chemistry, molecular modeling, materials design, medicinal chemistry, structural biology and chemical informatics. International Union of Crystallography (IUCr), is a world-wide organization of crystallographers which unites many local and regional organizations, comprising biologists, chemists, mineralogists, geologists and physicists. The IUCr publishes the eight-volume International Tables for Crystallography providing essential background information for crystallographers, and eight important scientific journals, the six parts of *Acta Crystallographica*, the *Journal of Applied Crystallography*, and the *Journal of Synchrotron Radiation*.

# Homeopathy: A Gentle Approach to Healing



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In the world of medicine, while conventional treatments often focus on suppressing symptoms, a unique system known as homeopathy offers a different perspective: stimulating the body's own healing mechanisms. It's a holistic approach that seeks to restore health from within, founded on principles that have stood the test of time.



## **The Genesis of a New Medical System**

The story of homeopathy begins with its founder, Christian Friedrich Samuel Hahnemann (1755–1843). Born in Meissen, Germany, Hahnemann was a brilliant physician who became disillusioned with the harsh medical practices of his time.

- He mastered eight languages by age 24.
- Earned his M.D. from the University of Erlangen.
- Observed that conventional "allopathic" medicine often failed to provide lasting cures, especially for chronic conditions.

These realizations motivated him to seek a more effective and humane system of healing.

## **The Three Laws of Homeopathy**

In 1796, Hahnemann made a groundbreaking observation while translating a medical text. He noted that cinchona bark, used for malaria, produced fever-like symptoms in a healthy person. This inspired the idea that a substance causing symptoms could also cure similar symptoms—a radical shift in medical thought.

From this insight, three fundamental principles of homeopathy emerged:

- 1.The Law of Similars (Similia Similibus Curentur): “Let likes be cured by likes: A substance that causes symptoms in a healthy person can treat similar symptoms in a sick person.
- 2.The Law of Simplex: Only one medicine should be prescribed at a time, avoiding complications of multiple drugs.
- 3.The Law of Minimum Dose: Through dilution and succussion (potentization), medicines become more effective while minimizing side effects.

These principles stood in stark contrast to the medical norms of his era, earning Hahnemann both criticism and admiration. Facing opposition in Germany, he eventually continued his work in Paris, where his ideas gained wider acceptance.

## **Beyond Symptoms: Addressing the Root Cause**

In 1828, Hahnemann introduced the concept of Miasms—Psora, Sycosis, and Syphilis—as the root causes of chronic diseases.

- These deep-seated imbalances, he believed, manifested as skin problems (eczema, psoriasis), internal conditions (ovarian cysts, arthritis), and even tumors.
- Suppressing symptoms with antibiotics or steroids could not provide permanent cures.
- Homeopathy, instead, aimed to correct these imbalances and restore true health.



### **The Homeopathic Difference: Safety and Similimum**

One of homeopathy's key strengths lies in its safety profile and unique method of remedy selection.

- Remedies are tested on healthy human beings in a process called “proving.”
  - Each remedy has a unique symptom picture, guiding the search for the similimum—the most appropriate single medicine for the patient.
  - Potentized remedies are gentle, effective, and virtually free from side effects or drug allergies.
- Unlike temporary relief provided by suppressive treatments, homeopathy seeks permanent restoration of health, addressing both physical and emotional well-being.

### **Conclusion: A Holistic Path to Healing**

In a world where medical treatments are often complex and harsh, homeopathy offers a gentle, safe, and holistic alternative. It respects the body's innate ability to heal and provides not only relief from disease but also the possibility of lasting wellness





# EVENTS AND UPDATES

## Upcoming events & Opportunities





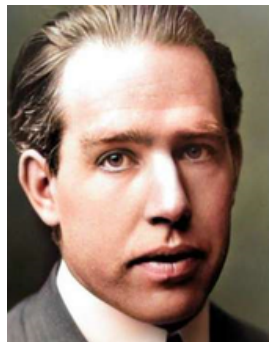
# Upcoming events & Opportunities 2025

Date

Scientist/Inventor & Occasion

Program Details

October 7



*Niels Bohr's Birthday  
(Born: October 7, 1885)*

*Danish physicist who made foundational contributions to understanding atomic structure and quantum theory.*

*"The Quantum Leap"  
Workshop*

*An interactive session on quantum mechanics, led by a faculty expert. Students will learn about Bohr's model of the atom and its significance. A demonstration of quantum phenomena using simple analogies will be included.*

October 19



*S. Chandrasekhar's  
Birthday  
(Born: October 19, 1910)*

*Indian-born American astrophysicist and Nobel laureate known for his work on the evolution of stars and the Chandrasekhar limit.*

*"Stars and Beyond"  
Astronomy Talk*

*A guest lecture by an astronomer on stellar evolution, black holes, and neutron stars. The event will also feature a night sky observation session using school telescopes.*

October 21



*Alfred Nobel's Birthday  
(Born: October 21, 1833)  
Swedish chemist, engineer, and inventor of dynamite, who willed his fortune to establish the Nobel Prizes.*

*"Nobel Prize Challenge"  
Competition*

*A team-based quiz competition covering the history of the Nobel Prizes and the achievements of past laureates in physics, chemistry, and medicine. The event concludes with a short film on Alfred Nobel's life.*

## October 28



*Jonas Salk's Birthday  
(Born: October 28, 1914)  
American medical  
researcher who developed  
one of the first successful  
polio vaccines.*

*"Vaccines: A Scientific  
Triumph" Seminar  
A seminar discussing the  
history and impact of  
vaccines, Salk's  
groundbreaking work, and  
the role of vaccination in  
global health. Students will  
participate in a Q&A  
session with a public  
health expert.*

## November 30



*Jagadish Chandra Bose's  
Birthday  
(Born: November 30,  
1858)  
Indian physicist, biologist,  
and botanist who  
pioneered the investigation  
of radio and microwave  
optics. He also made  
significant contributions to  
plant physiology*

*"Plants Can Feel"  
Workshop  
An interactive  
demonstration of Bose's  
experiments on plant  
responses to stimuli.  
Students will get hands-on  
experience using simple  
equipment to understand  
how plants react to  
external factors,  
highlighting his pioneering  
work in biophysics.*

## December 25



*Isaac Newton's Birthday  
(Born: December 25, 1642)  
English mathematician  
and physicist, widely  
regarded as one of the  
most influential scientists  
of all time for his laws of  
motion and universal  
gravitation.*

*"Exploring Gravity" Physics  
Lab  
A hands-on physics lab  
where students will  
perform experiments to  
demonstrate Newton's laws  
of motion. Activities will  
include measuring  
acceleration and  
understanding the concept  
of gravity.*



# AKNOWLEDGEMENT

I take this opportunity to express my heartfelt gratitude to all the respected teachers of the School of Science, YBN University for their constant support, encouragement, and valuable contributions that helped in shaping this edition of our newsletter VISIONA. Their guidance has been an inspiration throughout the process.

I would like to offer my special thanks to the students and other contributors for sharing their creative knowledge, ideas, photographs, informative articles and Logistic supports. The students, in particular, have fulfilled a major part of this newsletter with their enthusiasm and dedication, making VISIONA truly vibrant and meaningful.

I sincerely thank everyone whose collective effort has made VISIONA a reality and a platform for knowledge and inspiration for the Nature and Society.

**Dr. Madhumanti,  
Editor In Chief,  
E-Newsletter “Visiona”**

Thank you



# CALL FOR CONTRIBUTIONS FOR THE NEXT ISSUE



We are delighted to announce that preparations have begun for the next issue of our School of Science E-newsletter, VISIONA. This platform thrives on your creativity, ideas, and enthusiasm, and we warmly invite contributions from teachers, students, and staff.

You may share:

- Articles, essays, or short notes on recent developments in science
- Poems, stories, or reflections related to science and innovation
- Photographs or artwork of plants, animals, or scientific themes
- Achievements, awards, or news updates from our School of Science community

Your contributions will not only enrich VISIONA but also inspire curiosity and collaboration among readers.

📧 Kindly submit your entries by 15<sup>th</sup> December 2025 to [drmadhumanti9@gmail.com](mailto:drmadhumanti9@gmail.com).

Together, let us continue to make VISIONA a vibrant expression of science, knowledge, and creativity.

