



zooverse

**DEFINING AND REDEFINING DISEASES AND
IT'S IMPACT ON SOCIETY**

ABSTRACT PROCEEDINGS

Organized by
Post Graduate
Department of Zoology
Under the aegis of IQAC
BANWARILAL BHALOTIA
COLLEGE
Paschim Bardhaman,
713303

[Affiliated to Kazi Nazrul University]

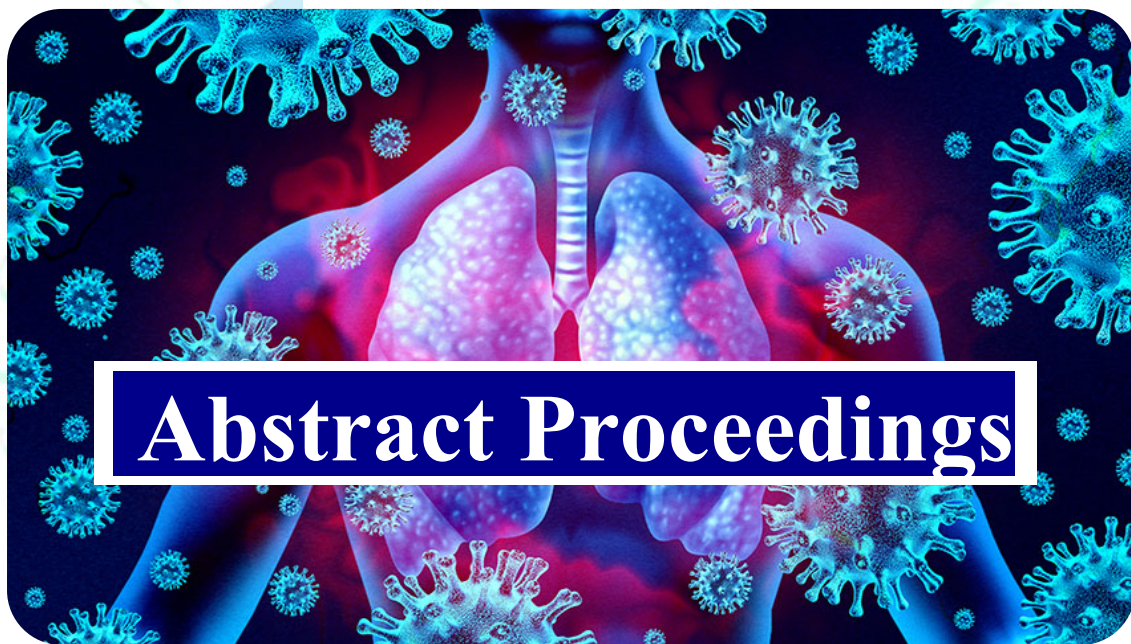




“DEFINING AND REDEFINING DISEASES AND IT’S IMPACT ON SOCIETY”



NOVEMBER 22ND, 2024



Abstract Proceedings

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About the College

B.B. College is a distinguished multi-shift single-unit college that offers 27 honours programs and professional courses such as BBA and BCA. I am proud to declare that, in addition to undergraduate and post-graduate courses, students enrolled in PG courses in Physics, Zoology, and Hindi have consistently performed well over the previous few years. Our college offers distance education courses with 3500, 500, and 2000 students with IGNOU, MANUU, and NSOU. Apart from effectively delivering online learning, during the lockdown, we have engaged in a variety of activities, such as hosting workshops, webinars, and seminars on a variety of topics to educate students and faculty, and signing MOUs with reputable institutes to expose students to most up-to-date scientific knowledge. Along with our traditional degree courses, we have established several Certificate & Value-Added courses (Online as well as Offline) with the goal of skill development and future work opportunities for students. At the same time, our college, besides providing quality education, looks after community service, and students actively participate in such activities through our, NCC, and Bharat Scout & Guide. Our Wi-Fi-enabled college campus is dotted with an Administrative Block, an Arts Block, and a Library with a massive collection of books and a spacious reading room; a Science & Commerce Block with well-equipped laboratories. Every year, several scholarships and financial help are awarded to deserving and needy students. At B.B. College, we feel that striving for a better future for our students is the most important thing we can do. Meeting the issues of the practical world while maintaining our essential human ideals can lead to a better future. "What is the sense of polishing outside when there is no inside?" remarked Swami Vivekananda. A successful individual must first and foremost be a good human being. "Success comes to those who work hard and stays with those who don't rest on their laurels of the past," I think as we celebrate 79 years of exemplary service. We are aware of the need for continuous modification and upliftment in our thinking and efforts to keep up with the radical changes occurring in the socioeconomic environment as a result of massive technological advancement, and we hope to move forward in a new and better direction with each passing year.

About the Department

The Post Graduate Department of Zoology of Banwarilal Bhalotia College, Asansol is one of the leading departments of Zoology in West Bengal. This department has a glorious history since its inception in 1962. The two most notable milestones among several were the introduction of BSc honours in 1975 and postgraduate course in 2012. Since 2016, the department is affiliated to Kazi Nazrul University. Currently, it offers MSc, BSc honours, Zoology Programme and Generic Elective courses and some certificate and value-added courses like Fish Nutrition, Cell Culture Techniques and Environmental Science. The department facilitates a basic and comprehensive approach toward developing skills in vocational disciplines such as Aquaculture and Fisheries, Entomology, Vermicomposting and Research Methodology. They mentor their students in groups and guide them in achieving their academic and career goals.

The department takes pride in its laboratories equipped with state-of-the-art instrumentation facility. Lessons in the department include modern ICT based teachings (classrooms with a smart board, laptop, projector, appropriate software and Wi-Fi-based internet connection), excursion-based learning (Excursion is mandatory for students), fieldwork-based learning, and the traditional chalk-talk methods. During the COVID-19 pandemic, the faculties have uploaded curriculum-based e-materials on the college website apart from taking online distance learning classes through available means.

About the Conference

A key component of national prosperity is health. Enhancing global health, health equity, and economic development all depend on research carried out on health and diseases. The seminar's main goal is to examine current theories, new discoveries, and difficulties in various fields of health and diseases. In order to share research experiences and ideas on a variety of topics related to diseases and health research, ZOOVERSE-2024 is an interdisciplinary event that invites participants from various universities, colleges and research institutes. Additionally, this conference offers a chance to interact with top researchers, scientists, academicians and students. For you, ourselves, and all conference attendees, it would be an amazing experience.

ZOOVERSE 2024 subthemes

- ✓ Infectious Diseases: Impact on society
- ✓ Fish Diseases: Impact on society
- ✓ Antibiotic resistance diseases: Impact on society
- ✓ Communicable diseases: Impact on society
- ✓ Non-communicable disease: Impact on society
- ✓ Mosquito borne diseases and global challenges
- ✓ Microbes and society
- ✓ The way ahead

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Banwarilal Bhalotia College

Constituent college of the **KAZI NAZRUL UNIVERSITY**, Asansol
(GOVT. SPONSORED U G & P G College)
ASANSOL - 713303, WEST BENGAL
(INDIA)

Dr Amitava Basu, M Com, Ph D
Principal

Ref:

Dated: 11.11.2024

Message

It is with great pleasure that the Post Graduate Department of Zoology of Banwarilal Bhalotia College welcomes you to our International Seminar on the societal impact of various diseases. We invite students from all Departments within our institution and beyond to participate and actively share their insights on this critical topic. This seminar aims to foster a deeper understanding of the far-reaching consequences of diseases on society and the ongoing efforts to address them. I extend my heartfelt gratitude to everyone involved in organizing this seminar. Let us work together to make this event a resounding success.

Dr. Amitava Basu
Principal
Banwarilal Bhalotia College
Asansol -713303

DR. AMITAVA BASU
Principal, B. B. College
Ushagram, Asansol, P Bardhaman
West Bengal - 713303



Keynote Speaker

Prof. Goutam Chandra
Vice Chancellor
The University of Burdwan
Rajbati, Bardhaman - 713 104

Invited Speakers

1. Dr Sourav Banerjee, Associate Professor
University of Dundee, UK
2. Dr. Satarupa Ganguly, Post Doctoral Associate (Gottschalk Lab),
Department of Immunology School of Medicine, University of
Pittsburgh, US
3. Dr Ranjit Kumar Ghosh, Associate Professor Bangabasi College,
Kolkata
4. Dr Debolina Sinha Banerjee, Assistant Professor, Vidyasagar
College, Kolkata-700006, WB, India
5. Dr Suprabhat Mukherjee, Assistant Professor, Department of
Animal Science & Coordinator of AHST, Kazi Nazrul University,
Asansol, West Bengal, India
6. Dr. Shreyasi Gupta, Assistant Professor Department of Zoology,
Triveni Devi Bhalotia College, Raniganj-713347, WB, India.
7. Dr Nilabja Sikdar, Scientist G, Estuarine and Coastal Studies
Foundation, Howrah, WB, India.

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HOD and Assistant Professor, Department of Zoology,
Banwarilal Bhalotia College, Asansol
- ✓ Dr. Koushik Kumar Mandal
Assistant Professor, Department of Zoology,
Banwarilal Bhalotia College, Asansol

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- ✓ Sri Raja Mukherjee, SACT-II, Department of Zoology, Banwarilal Bhalotia College, Asansol
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Department of Physics, Banwarilal Bhalotia College, Asansol.

BANWARILAL BHALOTIA COLLEGE

Message from the Convenors

Dear Delegates

Warm Greetings!!!

On behalf of the Post Graduate Department of Zoology, Banwarilal Bhalotia College, and the organizing committee, we would like to cordially welcome you all, on One -Day International Conference ZOOVERSE on “**Defining and Redefining diseases and its impact on Society**”. Diseases profoundly burden society, affecting economies, communities, and individuals in far-reaching ways. Defining and redefining diseases is crucial in the ongoing quest to combat and control the devastating impact of illnesses on individuals, communities, and societies. Defining diseases involves identifying and classifying specific conditions, and understanding their causes, symptoms, and transmission dynamics. On the other hand, redefining diseases entails revisiting existing knowledge, incorporating new research findings, and adapting our understanding to improve diagnosis, treatment, and prevention strategies. By continuously refining our comprehension of diseases such as tuberculosis, HIV, malaria, diabetes, and mental health disorders, we can create awareness, reduce stigma, and promote informed decision-making among the public. This, in turn, fosters empathy, encourages healthy behaviors, and supports global efforts to develop effective interventions, ultimately saving lives and improving quality of life.

The ZOOVERSE 2024 International Conference emphasized the crucial role of awareness in combating diseases. Renowned experts and researchers converged to stress the importance of educating the public about various diseases.

As convenors of the conference, we are well aware of our limitations but we will do our best to make your presence at Banwarilal Bhalotia College pleasant and productive and to have a good memorable experience with expert researchers of national and International repute.

We would like to thank our esteemed Principal Sir as well as all of the academic figures, faculty, and other staff members whose invaluable work enabled us to compile this volume of abstracts for this International Conference.

We welcome you all and thank your participation in ZOOVERSE 2024.

Dr. Sangita Lahiry

Assistant Professor

Post Graduate Department of Zoology

Banwarilal Bhalotia College, Asansol

&

Convenor

ZOOVERSE 2024

Dr. Koushik Kumar Mandal

Assistant Professor

Post Graduate Department of Zoology

Banwarilal Bhalotia College, Asansol

&

Convenor

ZOOVERSE 2024

PROGRAMME SCHEDULE

<i>Timing</i>	<i>Events</i>	
<i>Inaugural session</i>		
9.00a.m-10.00 a.m	<i>Registration</i>	
<i>Tiffin 9.00 a.m. to 10.00 a.m.</i>		
10.00a.m-10.20a.m.	<i>Calling all the dignitaries present in the dais, watering the plant by all the dignitaries present, felicitation of all the dignitaries present</i>	
10.20a.m-10.40a.m.	Welcome address	<i>Prof. (Dr.) Amitava Basu Principal Banwarilal Bhalotia College Asansol</i>
10.45a.m-11.30a.m.	Keynote Address by Chief Guest	<i>Prof. Gautam Chandra Vice Chancellor, The University of Burdwan Rajbati, Bardhaman</i>
11.30a.m.- 11.35a.m	Vote of Thanks	<i>Dr Sangita Lahiry Assistant Professor & Head of the Department Post Graduate Department of Zoology Banwarilal Bhalotia College, Asansol</i>

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Technical Session 1

Timing	Speaker	Title of the talk
12.00p.m.-12.20p.m.	Dr. Satarupa Ganguly, Post Doctoral Associate (Gottschalk Lab), Department of Immunology School of Medicine, University of Pittsburgh, US	<i>Transcription factors linking alveolar macrophage lipid regulation and inflammatory function</i>
12.20 p.m. – 1.00 p.m.	Dr Ranjit Kumar Ghosh, Associate Professor Bangabasi College, Kolkata	<i>Environmental Risk Factors and Non Communicable Diseases in the Contemporary Times</i>
1.00 p.m. – 1.30 p.m.	Dr Debolina Sinha Banerjee, Assistant Professor, Vidyasagar College, Kolkata-700006, WB, India	<i>Antibiotic Resistance: Unveiling Its Impact on Health, Economy, and Society</i>

Parallel poster session (12.00 p.m. to 1.30 p.m.)

1.30 p.m.- 2.30 p.m. Lunch break

Technical Session 2

Timing	Speaker	Title of the Talk
2.30 p.m. – 3.00 p.m.	Dr Sourav Banerjee, Associate Professor University of Dundee, UK	<i>Studying the role of novel secreted protein biomarkers in grade IV brain cancer</i>

3.00 p.m. – 3.40 p.m.	Dr Suprabhat Mukherjee, Assistant Professor, Department of Animal Science & Coordinator of AHST, Kazi Nazrul University, Asansol, West Bengal, India	<i>Human toll-like receptor 4 as a therapeutic target for intervening infectious and inflammatory diseases</i>
3.40 p.m. – 4.10 p.m.	Dr. Shreyasi Gupta Assistant Professor Department of Zoology Triveni Devi Bhalotia College, Raniganj-713347, WB, India	<i>Thyroxine (T3) mediated regulation of heart regeneration in H/R model of adult Zebrafish</i>
4.10 p.m. – 4.40 p.m.	Dr Nilabja Sikdar, Scientist G, Estuarine and Coastal Studies Foundation, Howrah, WB, India	<i>Identification of Novel Epigenetically Regulated Genes With Poor Prognosis in Indian Pancreatic Cancer Patients Cohort</i>

Parallel poster session (2.30 p.m. to 3.30 p.m.)

Prize distribution

4.40 p.m. -5.00 p.m.	Vote of thanks	<i>Dr Sangita Lahiry Assistant Professor & Head of the Department Post Graduate Department of Zoology Banwarilal Bhalotia College, Asansol</i>
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Certificates Distribution

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Zooverse 2024
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Abstract Proceedings

One-Day International Conference, Organized by PG Department of Zoology, Banwarilal Bhalotia College, Asansol, WB, India

Studying The Role of Novel Secreted Protein Biomarkers In Grade IV Brain Cancer

Sourav Banerjee

University of Dundee, Dundee, U.K.

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The goal of my research is to understand how intricately controlled phosphate additions on secreted proteins trigger the growth of stage IV brain cancer glioblastoma multiforme (GBM). GBM tumours have a highly heterogeneous population of malignant cells which is a challenge for chemotherapy and immunotherapy. Furthermore, GBM tumours have a large population of cancer stem cells which maintain a reciprocal crosstalk between themselves via specific secreted proteins to maintain malignancy. Recent advances in sequencing techniques provide us with important information on altered RNA levels of secreted proteins in GBM, however, very little information exists on protein modifications which are often the critical links to biological functions. Intriguingly, many secreted proteins are known to be modified by phosphate molecules (called phosphorylation) by a single enzyme. Mice lacking this enzyme in their brain survive brain-cancer challenge much better suggesting this enzyme is essential for GBM growth and is a potential therapeutic target. Hence the objectives of the proposed project are to utilise primary patient-derived GBM cells, state-of-the-art protein mass spectrometry and BiaCore core facilities at University of Dundee and world-class Cancer Research UK Edinburgh core facilities to study how the enzyme and its secreted substrates promote GBM tumour. GBM patients exhibit a dismal median survival of <2 years from initial diagnosis. Through my work I hope to reveal novel and putative risk stratification and therapeutic biomarkers for GBM and provide a much-needed option to the thousands of brain cancer patients worldwide.

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Keywords: Glioblastoma Multiforme (GBM), Malignant, Dismal median survival, Cancer.

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Abstract Proceedings

One-Day International Conference, Organized by PG Department of Zoology, Banwarilal Bhalotia College, Asansol, WB, India

Transcription factors linking alveolar macrophage lipid regulation and inflammatory function

Satarupa Ganguly^{1*}, Morgan Jackson-Strong¹, Brandon Michalides¹, Karsen E. Shoger¹ and Rachel A. Gottschalk^{1,2}

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²Center for Systems Immunology, University of Pittsburgh,

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Alveolar Macrophages (AMs) are tissue resident macrophages that are responsible for catabolism of pulmonary surfactant and initiation of inflammatory responses. Impaired AM function leads to their intracellular accumulation of lipids and altered immune function, associated with changes in transcription factor expression and activity. AMs are highly plastic and can rapidly shift to pro-inflammatory function to support pathogen clearance, and dysregulation of AM inflammatory function leads to increased mortality in bacterial pneumonia. Previously, we found increased expression of the transcription factor GATA2 in lipid-laden foamy AMs and GATA transcription factors have been shown to drive anti-inflammatory macrophage function. We hypothesize that GATA2 cooperates with known transcription factors associated with lipid metabolism to regulative AM homeostatic and inflammatory function. We are using novel myeloid specific GATA2 KO mice (LyzM-Cre x Gata2fl/fl) to understand the role of GATA2 in AM lipid regulation and inflammatory responses following intratracheal *Staphylococcus aureus* infection. Single-cell suspensions prepared from whole lungs and CD11c+SiglecF+ AMs were sorted directly into Trizol LS. We used qPCR to detect changes in mRNA level for specific target genes in sorted AMs at 0, 4, 24, and 48 hours post infection and we performed RNAseq analysis of AMs sorted from whole lungs, 24 hours after *S. aureus* infection, comparing conditional GATA2 KO and Gata2fl/fl control mice. In preliminary experiments, sorted AMs from infected GATA2 KO mice with *S. aureus*, showed decreased expression of pro-inflammatory cytokines (TNF, CCL3) by qPCR. Our preliminary RNAseq analysis of sorted AMs from conditional GATA2 KO and Gata2fl/fl control lungs 48 hours after infections revealed GATA2-dependent expression of the transcription factor CEBPb, a critical regulator of lipid metabolism in AMs. Unraveling the interaction and coordinated role between GATA2, CEBPb, and other lipid regulating transcription factors will help in better understanding the mechanisms regulating the appropriate balance of homeostatic and inflammatory AM programs.

Keywords: Alveolar Macrophages (AMs), bacterial pneumonia, GATA2, CEBPb

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Environmental Risk Factors and Non Communicable Diseases in the Contemporary Times

Dr. Ranjit Kumar Ghosh*

*Retired Associate Professor, Bangabasi College, Kolkata 700009, WB, India.

*Corresponding Author: drranjitghosh@gmail.com

Intensification of environmental risk factors are the major causes of increasing rates of non communicable diseases, leading to escalating rates of mortality throughout the world specially in low and middle income countries. Environmental hazards mostly caused by human activities are considered as one of the most important reasons of disease burden to the global health. Non communicable diseases, mainly cardiovascular diseases, cancers, chronic respiratory disorders, diabetes, mental health related issues along with neurodegenerative diseases, endocrine, gastrointestinal, renal, allergic and autoimmune disorders have drawn major attention in recent years creating global threat to public health. In this backdrop, the presentation would highlight several environmental risk factors like endocrine disruptive chemicals that has profound effects on various endocrine systems mostly by affecting at the cellular and molecular levels causing endocrine diseases and cancers.

Keywords: Environmental risk factors, Non-Communicable Diseases, Endocrine Disruptive Chemicals, Endocrine Disorders, and Global health.

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Human toll-like receptor 4 as a therapeutic target for intervening infectious and inflammatory diseases

Suprabhat Mukherjee, Ph.D.

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Manipulation of human immune system has been the current trend in developing efficacious therapeutics against fatal/life-threatening infectious and inflammatory diseases. In this context, toll-like receptors (TLRs) could be the useful targets in adopting effective therapeutic approaches. TLR4 ubiquitously expresses in both immune and non-immune cells. TLR4 is the most functionally diverse, broad-spectrum and flexible TLR in human that regulates both pro- and anti-inflammatory responses. For the last 14 years, my research objective has been uncovering the role of TLR4 in immunity and immunopathogenesis of human diseases such as lymphatic filariasis (LF), COVID-19, monkeypox, primary amoebic meningoencephalitis (PAM), ulcerative colitis (UC), and colitis-associated cancer (CAC) as well as developing therapeutic intervention strategies against these disorders/diseases. In this context, the maiden study depicting bestrophin-9 was reported as a novel ligand of TLR4 to induce proinflammatory responses in macrophages. Later, bestrophin-TLR4 was targeted for developing novel anti-filarial chemotherapeutics while anti-bestrophin-9 antibody was developed to mitigate parasite load and inflammatory pathology of LF. Our research on TLR4 further guided exploration of SARS-CoV-2 spike protein as a ligand of TLR4 and subsequent development of a multiepitope multi-target chimeric vaccine 'AbhiSCoVac' against the coronaviruses and screening a number of TLR4-targeting phytochemicals. A few of our research findings was also successfully translated in developing effective TLR4-targeted therapeutic intervention strategies against UC and CAC as well as against other emerging diseases, such as monkeypox virus and brain eating amoebiasis. Taken together, these insights could be useful to conceive more attempts in deciphering the undiscovered roles of TLR4 in other human health problems and developing appropriate intervention strategies.

Keywords: TLR4, AbhiSCoVac, Primary Amoebic Meningoencephalitis (PAM), Ulcerative colitis (UC), Colitis-Associated Cancer (CAC), SARS-CoV-2

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One-Day International Conference, Organized by PG Department of Zoology, Banwarilal Bhalotia College, Asansol, WB, India

Thyroxine (T3) mediated regulation of heart regeneration in H/R model of adult Zebrafish

Shreyasi Gupta

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Hypoxia-induced damage to the heart muscle and its subsequent restoration or rebuilding are significant worldwide health care obstacle. Lower vertebrate species such as zebrafish (*Danio rerio*) provide a unique opportunity to research cardiac injury, repair, and regeneration, unlike mammals. Thyroxine (T3) is believed to be a hormone that plays a role in the trade-off for the development of endothermy and regenerative abilities in higher vertebrates. Nevertheless, the particular objectives of T3 in cardiac healing remain uncertain. This research induced cardiac injury in adult zebrafish through acute anemia-induced hypoxia/reoxygenation (H/R) using phenylhydrazine hydrochloride (PHZ) ($C_6H_8N_2.HCl$) to alter haemoglobin concentration, resulting in various morphological and nuclear abnormalities in red blood cells (RBCs) and ultimately causing haemolytic anaemia. A total of 10,226 genes showed changes in expression in the cardiac transcriptome when exogenous T3, T3 inhibitor 1-850, and T3 release blocker IOA were present or absent during microarray analysis. 11 candidate genes' expression was examined via qRT-PCR, and the findings aligned with the microarray data. The results from the microarray data were supported by histological evaluation using Masson's trichrome staining and immunofluorescence studies. Analysis of GO enrichment revealed significant participation of T3 in regulating genes related to oxidative stress, cardiac fibrosis, energy metabolism, autophagy, apoptosis, and regeneration in the early repair phase (seven days) of H/R-injured cardiac tissue. In general, this is the initial research that depicts a complete view of cardiac healing and regrowth after H/R injury in zebrafish, and the impact of T3 pre-treatment on it.

Keywords: Hypoxia-induced damage, Thyroxine (T3), Endothermy, Zebrafish

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Identification of Novel Epigenetically Regulated Genes With Poor Prognosis in Indian Pancreatic Cancer Patients Cohort.

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Background

Pancreatic ductal adenocarcinoma (PanCa) is noted for its high lethality, with a survival rate of approximately 12%. The study emphasizes the need for a deeper understanding of the disease's pathophysiology, particularly the role of ion channels in cancer progression.

Methods

Methylome data, generated using 450 K bead array, was compared between paired PDAC and normal samples in the TCGA cohort (n=9) and our Indian cohort (n=7). The total Indian Cohort consisted of n = 75. Validation of differential methylation (6 selected CpG loci) and associated gene expression for differentially methylated genes (10 selected gDMs) were carried out in separate validation cohorts, using MSP, RT-PCR and IHC correlations between methylation and gene expression were observed in TCGA, GTEX cohorts and in validation cohorts. Metascape and Enrich R were used for pathway analysis.

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Results

We identified 156 DMPs, mapped to 91 genes (gDMs), in PDAC; 68 (43.5%) DMPs were found to be differentially methylated both in TCGA cohort and our cohort, with significant concordance at hypo- and hyper-methylated loci. Enrichments of "regulation of ion transport", "Interferon alpha/beta signalling", "morphogenesis and development" and "transcriptional dysregulation" pathways were observed among 91 gDMs. Hyper-methylation of *NPY* and *FAIM2* genes with down-regulated expression in PDAC, were significantly associated with poor prognosis in the Indian patient cohort. *KCNJ5*, *CACNB2*, *CLIC5*, *RASA3*, *GABBR2*, *KCNA3* and *KCNA6* were identified as key ion transport genes. *KCNJ5* was found to be hypomethylated and overexpressed in this cohort, contrasting with its hypermethylated and underexpressed status in the TCGA cohort. High expression levels of *KCNJ5* were associated with poor survival outcomes in patients, as demonstrated by Kaplan-Meier survival analysis. This suggests that *KCNJ5* could serve as a potential prognostic biomarker for PanCa. *KCNJ5* was shown to be part of a highly clustered protein-protein interaction network, indicating its significant role in various biological pathways related to ion transport. The analysis revealed that *KCNJ5* interacts with other potassium channels and is involved in critical cellular functions. The study also performed molecular dynamics simulations to assess the stability of the Kcnj5 protein complex with protodioscin, suggesting its potential as a therapeutic target.

Conclusion

Ethnic variations in Indian PDAC patients may influence their epigenetic landscape. The study identified novel differentially methylated genes, mainly *NPY* and *FAIM2*, associated with poor survival and advanced tumor stages. *KCNJ5* could be a promising therapeutic target for Indian PanCa patients, but further validation is needed.

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Antibiotic Resistance: Unveiling Its Impact on Health, Economy, and Society

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Antibiotic resistance has emerged as a critical global health threat, undermining the ability to treat infections effectively and jeopardizing advancements in modern medicine. The inappropriate use of antibiotics in healthcare, agriculture, and animal husbandry has accelerated the development of multidrug-resistant pathogens. These pathogens render standard treatments ineffective, leading to higher morbidity and mortality rates, prolonged hospital stays, and a resurgence of diseases like tuberculosis, gonorrhoea, and bacterial pneumonia. Additionally, the overuse of last-resort antibiotics has accelerated resistance in pathogens, leaving few therapeutic options available.

The economic consequences of antibiotic resistance are equally alarming. It increases healthcare costs through the need for extended hospitalizations, advanced diagnostic tests, and the use of more expensive or experimental drugs. The loss of productivity due to prolonged illness and deaths further amplifies economic strain, particularly in low- and middle-income countries. Globally, it is estimated that antibiotic resistance could cost the world economy trillions of dollars annually by 2050 if left unaddressed.

Societally, the crisis disproportionately affects vulnerable populations, exacerbating healthcare disparities. Low-resource settings face the greatest challenges due to limited access to effective antibiotics, diagnostics, and healthcare infrastructure. Furthermore, antibiotic resistance endangers critical medical interventions such as chemotherapy, organ transplants, and major surgeries, which rely on effective prophylaxis against infections.

Combating this multifaceted challenge requires coordinated global action. Strategies include antimicrobial stewardship programs, research investments in novel antibiotics and alternative therapies, strengthened infection prevention measures, and public awareness initiatives. Immediate, collaborative efforts are essential to mitigate the cascading impacts of this crisis on health, economies, and societies.

Keywords: Antibiotic resistance, multidrug-resistant pathogens, morbidity, mortality.

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Cadmium Exposure Develops Antibiotic Resistance In microbes and Plants

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Cadmium (Cd) is a toxic heavy metal that has gained attention for its detrimental effects on both environmental and human health. In recent years, Cadmium exposure influences the evolution and development of antibiotic resistance in microorganisms and plants. Cd has been implicated in altering the soil, roots and even the microbiota composition of plant leaves and gut of various organisms, promoting the enrichment of antibiotic resistance genes (ARGs) and multidrug resistance genes (MDRs) within their respective genomes. The problem of the ARGs entering the food chain can have critical impact on the environment and mankind. Therefore, understanding the mechanisms by which Cd influences microbial communities and ARGs is crucial, as these changes could contribute to the spread of antibiotic resistance and impact host health. This presentation summarizes current research on Cd-induced changes in ARG profiles of some bacterial species found in soil, plant leaves and gut content of some organisms. It also highlights the respective mechanisms, and discusses its implications for health and ecological systems.

Keywords: Cadmium, ARGs, MDRs, Species richness

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Lifestyle for Prevention and Control of Diabetes

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Diabetes is a chronic metabolic disorder characterized by persistently high blood glucose levels due to insufficient insulin production, impaired insulin function, or both. It is categorized into three primary types: Type 1 Diabetes, an autoimmune condition where the pancreas produces little or no insulin; Type 2 Diabetes, the most common type, largely influenced by lifestyle factors and characterized by insulin resistance; and Gestational Diabetes, which occurs during pregnancy and often resolves after childbirth but increases the long-term risk of developing Type 2 diabetes. Preventing and managing diabetes, particularly Type 2, is heavily reliant on lifestyle choices. This article explores how targeted interventions can make a significant difference. Consuming a balanced diet rich in whole grains, lean proteins, fruits help in maintaining optimal blood sugar. Activities like brisk walking, swimming, cycling or yoga improve insulin sensitivity and aid in weight management. Chronic stress elevates cortisol levels, which can worsen blood sugar control. Adults should aim for 7-8 hours of quality sleep. Limiting alcohol consumption is essential, as Excessive drinking can lead to weight gain and unstable blood sugar levels. This article aims to inspire proactive action and reinforce the importance of lifestyle in preventing and controlling diabetes, paving the way for a healthier future.

Keywords: Diabetes, Lifestyle, Blood sugar, Indian prospective, Prevention & control

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New record of the genus *Neozavrelia* Goetghebuer with a known species *Neozavrelia lindbergi* Reiss from India (Diptera: Chironomidae)

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A non-biting midge genus *Neozavrelia* Goetghebuer, 1941 is recorded from Lungsel, Kalimpong, West Bengal. The study area is part of the Himalaya Biodiversity Hotspot. The genus is included under the tribe Tanytarsini being squama always bare, macrotrichia present in wing, anal lobe weakly developed or absent, and median volsella in the hypopygium always present. The genus is characterized by antenna with 8–13 flagellomeres, anal point broadly rounded and densely covered with pointed strong spines. The genus is distributed worldwide except Afrotropical and Neotropical regions. To date, 36 species are recorded from world with only six are reported from Oriental region. A single midge specimen was captured in UV light trap, preserved in DNA diluents, and mounted in glass slide. The specimen after microscopic examination is identified as *Neozavrelia lindbergi* Reiss, 1968 which is reported earlier from Palearctic Afghanistan, Oriental China and Nepal but for the first time recorded from India. The species is characterized by antenna with 8 flagellomeres, ultimate one with two apical setae, superior volsella oval bearing two apical setae with a prominent digitus and inferior volsella with an inward projection at the distal end. This study marks the first recorded incidence of the genus in India, significantly contributing to the understanding of midge diversity in the region.

Keywords. *Neozavrelia*, Tanytarsini, Chironomidae, First record, Eastern Himalaya hotspot, India

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Mpox-A Potential Pandemic

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The zoonotic viral disease known as monkeypox, or Mpox, is brought on by the monkeypox virus, of genus Orthopoxvirus. It was first discovered in humans in the Democratic Republic of the Congo in 1970, and it is currently becoming a global health concern. The illness has historically only been seen in Central and West Africa, but recent outbreaks in non-endemic areas, such as India, have highlighted its potential for worldwide spread. The virus can propagate by direct contact with contaminated objects leading to condition of high body temperature, rash, lymphadenopathy, and other symptoms, particularly in children and those with comorbidities.

In 2022, India reported its first cases of Mpox, which were primarily linked to international travel. In response to it, the Indian government instituted increased surveillance, isolation protocols, yet challenges remain, including low public awareness, insufficient immunity due to the termination of smallpox vaccination, and the difficulty of epidemic management in densely populated places.

This discussion aims to provide an overview of monkeypox's epidemiology, clinical presentation, and public health implications in the Indian context. It underscores the importance of strengthening diagnostic capacity, improving healthcare infrastructure, and fostering international collaboration to prevent and manage outbreaks effectively. Proactive research, vaccination programs, and community engagement are vital to mitigate the risk of monkeypox and protect public health in India and beyond so as to prevent a potential COVID19 like pandemic.

Keywords: Mpox , Zoonotic, Orthopoxvirus, Endemic, Pandemic.

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Effect of Gut Probiotic Bacteria in Alleviation of Mortality in Catfish Juveniles

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Catfish are one of the largest groupings of freshwater fishes. Catfish can be found all over the world as they can be used as ornamentals, food fish in aquaculture, research animals, and sport fish. Catfish are rarely raised commercially in the aquaculture industry because of their high juvenile death rate from malnutrition and disease susceptibility. Around the world, aquaculture is growing in innovative ways. Aquaculture output must be intensified and commercialized while developing a microbial control strategy. The emergence of diseases has become more common as aquaculture has expanded. Antibiotics are a commonly utilized control method to address this problem, but if used carelessly, they can be harmful to both humans and the environment. In search of a substitute, probiotics have lately surfaced as one of the feasible options for aquaculture health management. Probiotics can be applied directly to the rearing water or by feed supplements. Feed supplements can be artificial feed or live feed (chironomid larvae, *Tubifex*, *Artemia*, etc.). Probiotics might play with a certain level of sustainability in several ways, including immunological regulation, improved growth, survival, feed utilization, and disease exclusion, even though their exact mechanisms of action are unknown. This article discusses the commercial significance of catfish in the aquaculture industry along with the difficulties encountered when commercially rearing catfish juveniles because of their high mortality and how applying gut probiotic bacteria can lower mortality for improved growth and sustainability.

Keywords: Catfish, Probiotics, Live-feed, Juveniles, Mortality

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Metal-Organic Framework-Based Radiopharmaceuticals

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In recent years, MOFs have gained attention in the field of radiopharmaceuticals due to their tunable porosity, and functional versatility, which make them excellent candidates in nuclear medicine. The radiolabeled MOFs serve as carriers for specific targeting of tumours or other disease sites, offering improved diagnostic accuracy and enhanced treatment monitoring. Beyond imaging, MOF-based radiopharmaceuticals hold promise in targeted therapy too. Overall, MOF-based radiopharmaceuticals offer a new frontier in precision medicine, combining the benefits of advanced materials science with the precision of nuclear medicine for improved disease detection and therapy.

Keywords: MOF, radiopharmaceuticals, imaging, therapy

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Impact of Monsoon-Season Vegetable Diseases on Market Dynamics in Paschim Burdwan District

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The Paschim Burdwan district in West Bengal is a key area for vegetable cultivation, not only for local farmers but also for those coming from neighboring states like Bihar and Jharkhand. These farmers often lease cultivable land from local owners to grow vegetables, which they then sell in local markets. However, during the monsoon season, various diseases caused by fungi, bacteria, and viruses affect vegetables like tomatoes, okra, brinjal, and cucurbits. This study aims to identify these common diseases and assess their impact on the local market, including changes in supply, prices, and farmer income.

The research includes field surveys and data collection from farmers, market vendors, and agricultural officials. Key diseases such as blight, downy mildew, and mosaic virus are examined, focusing on their occurrence, symptoms, and the extent of crop damage. The study also explores the economic effects of these diseases, showing how they increase production costs and reduce the availability of vegetables, which leads to price changes.

Understanding how these diseases affect the market can help farmers, policymakers, and traders develop better management strategies to stabilize vegetable prices during the monsoon season.

Keywords: Paschim Burdwan, monsoon, blight, downy mildew, mosaic

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Two new species of the genus *Forcipomyia* Meigen, 1818 (Diptera: Ceratopogonidae) from India

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Ceratopogonidae is one of the largest and most diverse nematocerous families of the order Diptera (Insecta). These biting midges are distributed across almost all continents except Antarctica. Members of this family are well known for their agriculture and medico-veterinary importance (Lee *et al.* 1963, Yeh and Chaung 1996). This family comprises 6300 extant species worldwide under 109 genera, arranged in three subfamilies (Borkent and Dominiak 2020, Borkent 2024). *Forcipomyia* Meigen, 1818, one of the species richest genera under the Ceratopogonidae family, display astonishing diversity with around 1151 species around the globe belonging to 36 subgenera (Saha *et al.* 2009, Borkent and Dominiak 2020, Pal and Hazra 2022, Pal *et al.* 2023, Pal *et al.* 2024 a, b, c). The great diversity of this genus is reflected in India too, contributing to more than 86 species belonging to 14 subgenera (Pal *et al.* 2024 a, b, c). Members of *Forcipomyia* have shown a wide range of feeding diversity such as hematophagous, hemolymphophagous, nectarophagous, and pollenophagous (Szadziewski 2016) like other ceratopogonids. Specimens were captured with different types of light traps such as yellow filament bulb (40W), ultraviolet light (8W), and compact fluorescent lamps (27W) from different parts of West Bengal, India. Two new species of biting midges, *Forcipomyia* (*Forcipomyia*) *arcuatilis* **sp. nov.** and *Forcipomyia* (*Saliohelea*) *sternaspina* **sp. nov.** are described based on specimens collected respectively from the Dooars, and Sub-Himalayan region of West Bengal, a part of Himalaya Biodiversity Hotspot, India.

Keywords: Biting midges, Dooars, Key, *Saliohelea*, West Bengal.

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Antibiotic Resistance of Methicillin Resistant *Staphylococcus aureus* (MRSA)

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Antimicrobial resistance (AMR) is a critical global health issue driven by antibiotic overuse, leading to the emergence of resistant microorganisms. An intrinsic and acquired mechanism of antimicrobial resistance has been identified in many bacterial strains that are of high clinical importance.

Staphylococcal infections occur when host defense mechanisms are low or with treatment of drugs that compromise immunity. *Staphylococcus aureus* become resistant to antibiotics through de novo mutations in chromosomal genes, encoding a modified penicillin-binding protein (PBP2a) reducing the effectiveness of beta-lactam antibiotics. Another special feature of *S. aureus* pathogenesis is its ability to survive on both biotic and abiotic surfaces as it can live in the biofilm state. Methicillin-resistant *Staphylococcus aureus* (MRSA) is associated with high levels of morbidity. In humans, MRSA commonly causes severe infectious diseases specially hospital-acquired infections (HAIs), food poisoning, and pyogenic infections of the skin, etc. MRSA could be determined by PCR-based detection of the *mecA* gene and is resistant to cefoxitin.

This review is directed to understand host susceptibility, diseases, epidemiology, virulence factors, antibiotic resistance, identify novel therapeutic targets and control MRSA infection.

Keywords: Antibiotic, Biofilm, HAIs, PCR, MRSA .

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Acetaminophen hepato-toxicity and its prevention

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Acetaminophen (APAP) is a widely used analgesic and antipyretic drug and is safe at therapeutic doses but its overdose frequently causes liver injury. In earlier studies, we have demonstrated that arjunolic acid (AA) possesses protective roles against chemically induced hepatotoxicity. The purpose of the present study was to explore whether AA plays any protective role against APAP induced acute hepatotoxicity; and if so, what molecular pathways it utilizes for the mechanism of its protective action. Exposure of rats with a hepatotoxic dose of acetaminophen (700 mg/kg, ip) altered a number of biomarkers (related to hepatic oxidative stress), increased reactive oxygen species (ROS) production, reduced cellular adenosine tri phosphate (ATP) level and induced necrotic cell death. Arjunolic acid pre-treatment (80 mg/kg, orally), on the other hand, afforded significant protection in liver injury. Arjunolic acid also prevented acetaminophen-induced hepatic glutathione depletion and APAP-metabolites formation although arjunolic acid, itself did not affect hepatic GSH levels. Results suggest that this preventive action of arjunolic acid is due to the metabolic inhibition of the specific forms of cytochrome P450 that activates acetaminophen to NAPQI. In addition, administration of arjunolic acid 4 h after acetaminophen intoxication, reduced acetaminophen-induced JNK, and downstream Bcl-2 and Bcl-xL phosphorylation, thus protected mitochondrial permeabilization (MPT), loss in mitochondrial membrane potential and cytochrome C release. In conclusion, data suggest that arjunolic acid afforded protection against acetaminophen-induced hepatotoxicity through inhibition of P450-mediated APAP bioactivation and inhibition of JNK-mediated activation of mitochondrial permeabilization.

Keywords: Acetaminophen, Arjunolic acid, Hepato-toxicity

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New Tuberculosis Drugs in India: Challenges and Opportunities

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India has one of the highest numbers of tuberculosis (TB) cases globally, including tough-to-treat forms like multidrug-resistant (MDR-TB) and extensively drug-resistant (XDR-TB). New medicines like Bedaquiline, Delamanid, and Pretomanid offer hope with shorter and better treatments, especially for drug-resistant TB. These drugs are part of India's National Tuberculosis Elimination Program (NTEP) but face challenges in reaching all patients.

The main problems include high costs, limited availability, and difficulties in delivering these medicines to remote areas. Many healthcare workers need better training to use the new treatments, and patients often fail to complete the full course. Additionally, stigma and low awareness about TB, especially in rural areas, worsen the situation.

However, India's strong pharmaceutical industry can make these medicines cheaper and more accessible. Government efforts, like universal health coverage and digital tools for tracking treatment, can also improve access and patient adherence. Collaborations between public and private sectors, along with international support, can further help in making these drugs available to those who need them.

This paper looks at the challenges and opportunities for using new TB drugs in India and highlights the need for better policies, healthcare systems, and public awareness. Tackling these issues is key to achieving India's goal of ending TB by 2025.

Keyword: Tuberculosis (TB), MultiDrug-Resistant (MDR-TB), National Tuberculosis Elimination Program (NTEP), Bedaquiline, Delamanid.

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Antibiotic Resistance Assessment of Halophilic Bacteria Isolated from the Indian Sundarbans Estuary

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A serious and expanding concern to human and environmental health is the prevalence and spread of antibiotic resistance genes as new ecological pollutants. The study was carried out to isolate and evaluate antibiotic resistance of bacteria collected from rhizosphere soil (RS) at Pakhiralay (Gosaba subdivision), 24 Parganas (South), West Bengal, India, located in the Sundarbans Delta and non-rhizosphere soil (NRS) at Muriganga Kakramari Char near Sagar Island, 24 Parganas (South), West Bengal, India, during February 2024. Eight bacterial strains were isolated (RS1, RS2, RS3, RS4 and NRS1, NRS2, NRS3, NRS4) and were considered for calculating minimum inhibitory concentration (MIC) against tetracyclin with the control set. MIC values for the strains RS1, RS2, RS3, RS4 and NRS1, NRS2, NRS3, NRS4 were observed against tetracyclin and after that, tetracyclin with half of the respective MIC values was applied in soil and broth culture for five weeks each with one control set. The values of MIC after application of tetracyclin (half of previously determined MIC) were calculated and found to be much higher than the prior values. Attempts are made to identify the rhizosphere and non-rhizosphere halophilic bacterial strains and their evolution. Various studies reported that aquatic environments may serve as reservoirs for antibiotic-resistant bacteria (ARBs) and antibiotic-resistant genes (ARGs). As a result, these aquatic environments could be places where human diseases could acquire ARGs. A deeper comprehension of the degree and unpredictability of the natural resistant background and the magnitude of the anthropogenic effect is necessary for assessing such hazards.

Keywords: MIC, Antibiotic-resistant, Rhizosphere, Non-rhizosphere, Tetracyclin

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The Fight Against Multidrug-resistant TB: An Urgent Global Priority

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Multidrug-resistant TB (MDR-TB) is caused by *Mycobacterium tuberculosis* strains resistant to at least isoniazid and rifampin, the most effective first-line TB treatment drugs. It is a communicable disease transmitted through contact or can develop in patients with initially drug-susceptible TB. MDR-TB affects approximately 9 million people annually and is a growing international health concern, with cases of extensively drug-resistant TB (XDR-TB) also being reported. The latest approaches involve monitoring the proportion of drug-resistant TB among all TB cases. However, this method is less informative in high-burden regions such as sub-Saharan Africa, Eastern Europe, and China, where MDR-TB cases are disproportionately high. According to WHO estimates, there were about 450,000 incident cases of MDR/RR-TB in 2021, a 3.1% increase from 437,000 in 2020. Countries with the highest burden include Eastern Europe, Southeast Asia, and the Western Pacific region. China, India, and the Russian Federation alone account for 62% of global MDR-TB cases, though national data gaps may affect accuracy. Vaccines are under development and could play a key role in addressing both pre- and post-infection phases of TB, potentially curbing the MDR-TB crisis. Controlling MDR-TB is hindered by delayed diagnosis, prolonged and toxic treatment regimens, resistance to second-line drugs, inadequate healthcare infrastructure, poor patient adherence, limited vaccine options, and socioeconomic barriers like poverty and stigma. Global inequalities in funding and healthcare access further complicate efforts, especially in high-burden regions.

Keywords: Multidrug-resistant TB; Communicable disease; Delayed diagnosis; Global inequalities.

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First record of the genus *Allohelea* and a known species *A.minixia*(Diptera: Ceratopogonidae: Ceratopogoninae) from India

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A predaceous biting midge of the genus *Allohelea* Kieffer, 1917 is recorded from the Kaffergaon, Kalimpong, West Bengal, India. The region is part of the Himalaya biodiversity hotspot. The biting midges of the family Ceratopogonidae is one of the largest and most diverse nematoceros families in the order Diptera (Insecta). These biting midges are distributed across almost all continents except Antarctica. Members of this family are well known for their agriculture and medico-veterinary importance (Lee *et al.* 1963, Yeh and Chaung 1996). This family comprises around 6300 extant species worldwide under 109 genera, arranged in three subfamilies (Borkent and Dominiak 2020, Borkent 2024). They are relatively common inhabitants of streams, lakes, ponds and semiaquatic situations such as sphagnum bogs (Wirth and Grogan, 1988). Adult females are predaceous on chironomid midges and other smaller, soft-bodied insects. The midge was captured using light trap, preserved in DNA diluent and mounted in glass slide. The species is identified as *Alloheleaminixia* (Yu and Yan, 2004). This species is differentiated from other predaceous midges with aedeagus of male without basal loop, and parameres of various shapes. Till now, worldwide 62 species have been described under the genus *Allohelea*, with 25 were reported from the Oriental realm. The species was first described from the Fujian Province of the Oriental China in 2004. This marks the first time the genus *Allohelea* has been recorded in India. The species was originally described from the Fujian Province of China by Yu and Yanin 2004.

Keywords: *Allohelea*, Nematocera, Predaceous midges, Eastern Himalaya, West Bengal.

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The Physiological and Social Impact of Parkinson's Disease as a Non-communicable Disease

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Parkinson's Disease (PD) being the second most common neurodegenerative disease, comes under the non-communicable diseases category where the propagation of the disease depends on age, genetics and environmental factors. Though the actual reasons behind the disease expansion are still unknown, toxic aggregation of the protein Alpha synuclein is speculated as one of the main reasons. As consequences, degeneration of dopamine-producing neurones in the brain, specifically in the substantia nigra region is often detected where the dopamine is essential for performing motor functions. Symptoms lead to challenges with body coordination and performing fine motor skills and as non-motor symptoms, fatigue, sleep cycle disturbance and cognitive impairment are observed. Along with these, PD patients are often diagnosed with irregularities of autonomic functions like blood pressure fluctuations and gastrointestinal disturbances. With these much physiological symptoms, the disease have profound social impacts on patients. The unpredictability of physiological effects give rise to frustration and severe anxiety in social grounds and problems associated with attention and memory as a result of cognitive impairments hugely affect communication skills and social relationships, compelling the individual to detach from surroundings and social engagements. This article puts light on the several aspects of the effects of the mentioned disease with possible solutions to fight back.

Keywords: Parkinson's Disease, Non-communicable disease, Neurodegenerative disease, Social impact

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Impact of Proteotoxicity in Neurodegenerative Diseases

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Neurodegenerative diseases affect millions of people worldwide, representing a growing burden on society. A central focus of both past and current research has been to deepen our understanding of the mechanisms underlying proteotoxicity. Proteotoxicity refers to the harmful effects caused by damaged or misfolded proteins, which disrupt normal molecular pathways and ultimately lead to cellular and organismal damage. Specific proteins are implicated in various neurodegenerative diseases, as revealed through immunohistochemical studies of post-mortem tissue and genetic screenings, with protein misfolding and aggregation being key pathological features. These proteins often misfold and aggregate into soluble, non-native oligomers or large, insoluble deposits such as fibrils and plaques, both of which can exert toxic gain-of-function effects. This review aims to summarize existing current insights into the relationship between proteotoxicity and disease pathogenesis, highlighting the distinct mechanisms driving proteotoxicity in these disorders. Understanding these mechanisms is crucial for the development of future, much-needed disease-modifying therapies.

Keywords: cellular and organismal damage; insoluble deposits; misfolding and aggregation; neurodegenerative diseases; therapeutic intervention.

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Carbohydrate Based Synthetic Vaccines

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Vaccination is a preventive therapy that provides long-term protective immunity to the masses from specific diseases and hence considered to be the most effective and inexpensive means of averting epidemics. Usually, vaccines are generated from microbial organisms containing the organism or virus in a weakened, live, or killed state or protein toxins isolated from them. Glycan antigens needed for the preparation of bacterial capsular polysaccharide (CPS) based glycoconjugate vaccines are mostly procured from bacterial fermentation. The process often shows inconsistency in glycan chain length, raising difficulty in making specific glycoconjugate vaccines. This problem can be solved by applying basic glycosylation techniques to synthesize glycan antigens with accurate chain length.

The first licensed synthetic carbohydrate vaccine was developed against *Haemophilus influenzae* type b (Hib) in Cuba. Hib was the leading cause of bacterial meningitis in children before the introduction of the vaccine. The ribitol and ribose-based synthetic glycoconjugate antigen (trade name Quimi-Hib) was synthesized after introducing several modifications to the Hib capsular polysaccharide repeating unit. Other potential carbohydrate based vaccine candidates identified are against *Neisseria meningitidis*, *Streptococcus pneumoniae*, *Bacillus anthracis*, malaria, HIV, cancer and Kala azar or black fever. Many of them are already in use and some are being developed in different stages of trial procedures.

Keywords: Vaccination, Capsular polysaccharide, Carbohydrate

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Dengue: A Global Challenge

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Dengue, a mosquito-borne viral disease caused by RNA virus of the family Flaviviridae and spread by Aedes mosquitoes. It has become a significant global health concern with 390 million cases. A cute-onset high fever, muscle and joint pain, myalgia, cutaneous rash, hemorrhagic episodes, and circulatory shock are the commonly symptoms. The genetic factors underlying DENV pathogenesis and disease severity remain poorly understood. It is identified that specific genetic variants, including single nucleotide polymorphisms (SNPs) in the DENV genome and hosts (eg. TNF- α , IL-6), that increase disease severity and susceptibility. It is revealed that viral RNA structures and non-coding RNAs play a crucial role in DENV replication and transmission. Early and accurate diagnosis is critical to reduce mortality. The virus's rapid spread, exacerbated by climate change, urbanisation and global connectivity, underscores the urgent need for enhanced surveillance and monitoring, effective vaccine development and distribution, integrated public health policies.

Keywords - Dengue virus, genetic basis, cutaneous rash, hemorrhage, pathogenesis, disease severity.

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Dengue Prevention in India: Efficacy and Impact of the First Indigenous Vaccine

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Dengue fever, a viral illness transmitted by *Aedes* mosquitoes, remains a significant public health challenge in tropical and subtropical regions, particularly in India. Dengue is characterized by high fever, severe headache, joint and muscle pain, and rash. In some cases, it leads to life-threatening complications like dengue haemorrhagic fever and dengue shock syndrome, posing a growing burden on healthcare systems. The global incidence of dengue has been steadily rising over the last two decades, with over 129 countries reporting dengue infections by the end of 2023, as per the World Health Organization (WHO). In India, 75-80% of dengue infections are asymptomatic but still contagious, while 20-25% of symptomatic cases, especially in children, carry a higher risk of hospitalization and mortality. The Indian Council of Medical Research (ICMR) and Panacea Biotech have announced the launch of India's first Phase 3 clinical trial for a dengue vaccine. This ground-breaking trial will assess the effectiveness of DengiAll, an indigenous tetravalent dengue vaccine developed by Panacea Biotech. DengiAll is designed to protect against all four dengue virus serotypes (DENV-1, DENV-2, DENV-3, and DENV-4). Phase 1 and 2 clinical trials of the Indian vaccine were finished in 2018-19, yielding positive outcomes. The Phase 3 trial will be essential in evaluating the vaccine's safety, immune response, and its potential to prevent dengue infection in at-risk populations. If successful, DengiAll could become a vital tool in controlling dengue transmission in India and other endemic areas, providing an affordable and domestically produced solution to this widespread health threat.

Key words: *Aedes* mosquito; Dengue; Indigenous Vaccine; Tetravalent; Vaccine efficacy.

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Efficacy of silver nanoparticles fabricated using *Diospyros montana* leaf extract as a larvicidal agent against the dengue vector *Aedes aegypti*

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Nanoparticles are the particles of atomic and molecular scale, ranging from 1 to 100 nm in size. They have many interesting physical, biological, catalytic and optical properties that draw the attention of advanced research thinking. Recently the use of phyto-reduced silver nanoparticles as mosquito larvicide has been well established. Present study aimed at synthesizing silver nanoparticles using leaf extract of *D. montana* which showed promising larvicidal effect. The plant extract act as reducing and stabilizing agent during nanoparticles formation. The characterization of the synthesized nanoparticles was done by UV-VIS-spectrophotometer, X-Ray diffraction, SEM, TEM and DLS. Plant compounds were analyzed through qualitative phytochemical tests and LCMS analysis. According to the standard protocol of WHO, bioassay was performed against all the four instars of *Aedes aegypti* and mortality was noted after 24, 48, and 72 hours of exposure. Cent percent mortality has been noted at 10ppm concentration of nanomaterial after 48 hours of exposure against all the instars larvae. LC⁵⁰ and LC⁹⁰ values were determined from log-probit analysis. Very low toxicity was recorded against non- target organism when treated with these green synthesized nanoparticles. Hence, the green synthesized nanoparticles from *D. montana* could be used as an effective larvicide against *Aedes aegypti* mosquito.

Keywords: Nanoparticles, *Diospyros montana*, *Aedes aegypti*, Larvicide

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Impact of Bioaccumulation of Zinc, Copper and Lead in Fish and its Effect on Society in West Bengal

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The major cause for mortality of fish in fisheries sector is oxygen deficiency. The level of oxygen in the atmosphere is about 21 %, but sparingly soluble in water and plays a limiting factor in fish life. Oxygen concentrations range from 6 to 15 mg/L depending on different factors such as salinity, temperature, and pressure. Fish will die from anoxia when dissolved oxygen level reach a critical concentration. The U.S. Environmental Protection Agency (EPA) recommends dissolved oxygen concentrations 5 mg/L for maintenance of healthy fish populations. There are three types of oxygendeficiency are observed in fishes such as summer, winter and turnover. Summer oxygen deficiencycause high death rates in large fishes and small fishes may be seen lethargically gasping for air inshallow water. The turnover oxygen deficiency occurs due to biological oxygen demand by polluted material present in the water bodies. Oxygen-depleting pollutants are domestic sewage or factory and farm effluents, different types of metal effluents, different toxic gases, Chemical pollutants, pesticides and herbicides. Polluted water causes emergence of different parasites whichaffect fish ranging from amoebae to crustaceans, bacteria *Salmonicida*, *Aeromonas*, viral and fungal. As a result of fish diseases have significant effects on society, particularly in by decreasing fish production, increasing costs, loss of livelihoods, reduced food security, etc. The main of this article is to review the environmental factors lead to oxygen deficiency, anoxia, its type, oxygen-depleting pollutants, emergence of different parasites, and risk to human health.

Keywords: Environmental factors, Fish diseases, Anoxia, different forms, Human health

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Lanthanides in Drug Delivery and Therapeutics

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In recent times, Lanthanide-based drug delivery have garnered significant interest. Lanthanides exhibit unique physicochemical properties, including their high magnetic susceptibility, luminescence, and versatile coordination chemistry. These characteristics make lanthanides ideal candidates for applications in targeted drug delivery, imaging, and theragnostic. Lanthanide-based complexes are being explored as both diagnostic agents and therapeutic tools, offering advantages such as enhanced sensitivity for imaging modalities like magnetic resonance imaging (MRI) and Upconversion Luminescence imaging (UCL). They also provide controlled spatiotemporal drug release and their real time monitoring. For these special characteristics, lanthanide-based drugs are promising for efficient application in Cancer therapy specially in combined Chemotherapy and photodynamic therapy.

Keywords: Lanthanide complex, Drug delivery, Chemotherapy, Photodynamic therapy

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Larvicidal Efficacy of Papaya Seed Extracts Against *Culex vishnui* Mosquito

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The study aims to assess the larvicidal efficacy of Papaya seed extracts (crude and solvents) against the rice field mosquito, *Culex vishnui*, which is the vector of Japanese encephalitis. The crude extract of fruits has a strong larvicidal effect. The larvicidal bioassay with chloroform: methanol extractive outperformed the other solvent extractives of fruits. After 72 hours of exposure in a larvicidal bioassay, chloroform: methanol extractive had the lowest LC50 and LC90 values, which were 46 ppm and 186 ppm, respectively, against 1st instar larvae. Nontarget organisms. Such as *Diplonychus annulatum* nymphs, were found to be unaffected by the said extracts. Thus, we can claim that the fruits of *Papiya seed* exhibit outstanding larvicidal efficacy against the *Cx.vishnui* mosquito.

Keywords: *Culex vishnui*, Papaya seed, *Diolonychus annulatum*, Larvicidal bioassay

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Antibiotic Resistome Pattern of Bacteria Isolated from Poultry Faeces

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A comprehensive investigation was conducted to assess the antibiotic-resistance properties of bacteria isolated from poultry faeces, with the primary goal of understanding the composition and prevalence of Antimicrobial Resistance. Fresh poultry faecal samples were collected from various poultry farms for analysis. Recognizing the significant threat posed by antibiotic resistance to both animal and human health, especially due to the excessive use of controlled antibiotics in animal husbandry, efforts were made to isolate and evaluate antibiotic-resistant bacteria from the faecal samples. The preliminary findings indicated the presence of both gram-positive and gram-negative bacteria in the samples. It was observed that 41% of the bacteria exhibited resistance, with specific colonies identified as 17, III, IV, 16, and II. Notably, three bacterial colonies, namely 17, III, and IV, demonstrated multi-drug resistance, highlighting the urgent need for effective strategies to mitigate the contamination and curb the proliferation of antibiotic-resistant bacteria in poultry environments.

Keywords: Poultry faeces, Sterilization, Colony-forming units (CFUs), Antibiotic resistance, Food safety, Public health implications

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Effect of *Jacquinia ruscifolia* Jacq. Leaves extract on *Culex quinquefasciatus* Say, 1823

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Among a good number of mosquito species, *Culex quinquefasciatus* of tribe culicini, commonly known as the southern house mosquito, is the prime vector of lymphatic filariasis. Filariasis is an endemic disease in tropical and subtropical countries and around 1.2 billion people are facing a higher risk of this disease across the globe. Besides biocontrol methods using safer insecticides having botanical origin is a simple and sustainable way to control mosquitoes.

The study is carried out to establish the larvicidal activities of *Jaquenia ruscifolia* green leaf extracts against third instar larvae of *Culex quinquefasciatus* under laboratory and semi-field conditions along with isolation and identification of bioactive compounds responsible for the larvicidal activity. Dose-dependent mortality was performed through graded concentrations with crude leaf extract (0.5, 1.0, 1.5, 2.0 and 2.5%), chloroform: methanol solvent extract (50, 100, 150, 200 and 250 ppm) and TLC fraction (50, 60, 70, 80 and 90 ppm) under laboratory condition and highest mortality were observed at highest concentration after 72 h of exposure in each case. In semi-field bioassay, larvae were treated with five consecutive (50, 100, 150, 200 and 250 ppm) concentrations of solvent extract and highest mortality was found at 250 ppm concentration in 72 h of exposure. The presence of terpenoids was noted in preliminary phytochemical screening of solvent extract. FTIR analysis suggests the presence of functional groups like as ketone, ether, amines, alkanes and alcohols. Pure compounds isolated from solvent extract through TLC and GC-MS analyses indicates the presence of Dipiperidino disulfide, 3-methyl-2-butenoic acid, Urea 1-methyl cyclopropyl and Bicyclo (2,2,2) octenone.

Keywords: *Culex quinquefasciatus*, *Jaquenia ruscifolia*, Larvicidal activity, Phytochemical

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Do We Need to Contain the Containers? A Tell-tale Indication From Breeding Sites of Dengue Vectors in Kolkata, India

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Dengue vectors breed in diverse habitats that vary in size and resources, registered through several empirical studies in India. Among these, the containers of varied sources are preferred sites for breeding by the dengue vectors. A comparative account of the pupal productivity of the dengue vectors and the abundance and source of the containers were assessed as a part of entomological surveillance in Kolkata, India. Identification of the anthropogenic factors leading to the generation of the containers may help dengue vector management with higher precision. An assessment of the pupal productivity of dengue vectors from various published literature as well as recent surveillance indicate that earthen, glass, plastic containers and different phytotelmata are exploited for breeding by the dengue vectors *Aedes aegypti* and *Ae. albopictus*. Although the productivity varied with the size of the containers, the containers appeared to be the domestic discarded solid wastes. Irrespective of the type of the containers, the packaged food and dairy products contributed largely followed by the beverages as sources. Minor contributions from various other sources linked with anthropogenic activities were observed.

A clear indication to reduce the generation of waste containers is reflected in the present observations. Apparently, social factors linked use and discard of containers as waste in the environment should be addressed to reduce the breeding of dengue vectors.

Keywords: *Aedes* mosquito, Dengue, Mosquito larval habitats, Containers

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Neuroendocrine System in Insects

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The neuroendocrine system in insects represents a fascinating intersection of neural and hormonal regulation, orchestrating a myriad of physiological processes essential for survival and adaptation. This study delves into the intricate network of neuroendocrine cells and their secretions, highlighting their pivotal roles in growth, development, reproduction, and stress responses. By employing advanced molecular techniques and comparative analyses, we uncover the evolutionary adaptations that enable insects to thrive in diverse environments.

Our findings reveal the complexity of neuroendocrine signaling pathways, emphasizing the interplay between neuropeptides and hormones in modulating insect behavior and physiology. We explore the functional diversity of neuroendocrine organs, such as the corpora cardiaca and corpora allata, and their contributions to homeostasis and metamorphosis. Additionally, we discuss the implications of neuroendocrine research in pest management and the potential for developing novel biocontrol strategies.

This comprehensive review not only enhances our understanding of insect biology but also underscores the broader significance of neuroendocrine systems across taxa. By bridging the gap between neurobiology and endocrinology, our work paves the way for future research aimed at unraveling the complexities of hormonal regulation in insects. Join us as we embark on a journey through the microscopic world of insect neuroendocrinology, where every neuron and hormone tells a story of survival, adaptation, and evolution.

Keywords: Neuroendocrine system, Insects, Neuropeptides, Hormones, Corpora cardiaca, Corpora allata, Homeostasis, Metamorphosis, Pest management, Biocontrol strategies

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Evolution of Antibiotic Resistance in Klebsiella Pneumoniae

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Klebsiella pneumoniae is one of the most virulent bacteria that has become a serious concern among medical and medicinal scientists for the last couple of years. Worldwide every year almost 7 lakh deaths occur due to various types of infections caused by this particular bacterial species. Despite an extraordinary advancement in medical technologies and pharmaceutical applications, the growth of this bacteria cannot be truly prohibited in multiple cases. The consistent and uncontrollable mutational changes in such bacteria make them extremely robust, and dangerously lethal to human life. Extensive research findings have already demonstrated that through various resistive mechanisms, K. pneumoniae has developed a strong potential to withstand a broad range of antibiotic drugs, starting from β -lactams, aminoglycosides, tetracyclines, quinolones, and sulphonamides. Owing to this, they are now considered “pan-drug-resistant (PDR).” This article endeavours to revisit the gradual changes that occurred in Klebsiella pneumoniae from its first detection in 1875 to the present. It also provides a brief discussion on the different types of defence mechanisms of K. pneumoniae against various classes of antibiotics and their overall impact on human health.

Keywords: Klebsiella pneumoniae, mutational changes, β -lactams, aminoglycosides, pan-drug-resistant (PDR),

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The Human Health Threat of Visceral Leishmaniasis: A Leading Parasitic Killer

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Leishmaniasis, a protozoan infection, is one of the most neglected tropical diseases (NTDs), affecting over one billion people across nearly all continents. Among its forms, Visceral Leishmaniasis (VL), or Kala-azar, is the most severe, posing a major public health challenge in tropical and subtropical regions. According to the World Health Organization (WHO), VL is the second deadliest parasitic disease after Malaria and the third largest parasitic killer globally, following Malaria and Filariasis. India contributing over 50% of global cases of VL. Bihar, the most affected state, accounts for nearly 70% of India's VL burden due to socio-economic challenges, poor housing, malnutrition, and favourable conditions for sandfly vectors. To combat this burden, WHO launched a global elimination strategy focused on the Indian subcontinent, emphasizing vector control, early diagnosis, effective treatment, and strengthened healthcare systems. The London Declaration on NTDs (2012) further prioritized VL and integrated it into the Sustainable Development Agenda (2015–2030). VL epidemiology is shaped by factors like poor housing, malnutrition, and environmental changes, which increase susceptibility and disease spread. Management relies on antileishmanial drugs such as Sodium Stibo Gluconate (SSG), Sodium Antimony Gluconate (SAG), liposomal amphotericin B and miltefosine, though challenges like drug resistance, high costs, and access remain significant. To reduce VL's impact, policy interventions, public awareness campaigns, and international collaboration are critical. Advances in vaccines and diagnostics offer hope, but sustained funding and commitment are vital for achieving control and elimination targets in endemic regions.

Keywords: Visceral Leishmaniasis, Neglected tropical disease, Second deadliest parasitic disease, Sustainable Development Agenda

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Impacts of Oxygen deficiency in the Fisheries sector Lead to Fish Diseases and its Adverse Effect on Society

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The major cause for mortality of fish in fisheries sector is oxygen deficiency. The level of oxygen in the atmosphere is about 21 %, but sparingly soluble in water and plays a limiting factor in fish life. Oxygen concentrations range from 6 to 15 mg/L depending on different factors such as salinity, temperature, and pressure. Fish will die from anoxia when dissolved oxygen level reach a critical concentration. The U.S. Environmental Protection Agency (EPA) recommends dissolved oxygen concentrations 5 mg/L for maintenance of healthy fish populations. There are three types of oxygen deficiency are observed in fishes such as summer, winter and turnover. Summer oxygen deficiency cause high death rates in large fishes and small fishes may be seen lethargically gasping for air in shallow water. The turnover oxygen deficiency occurs due to biological oxygen demand by polluted material present in the water bodies. Oxygen-depleting pollutants are domestic sewage or factory and farm effluents, different types of metal effluents, different toxic gases, Chemical pollutants, pesticides and herbicides. Polluted water causes emergence of different parasites which affect fish ranging from amoebae to crustaceans, bacteria *Salmonicida*, *Aeromonas*, viral and fungal. As a result of fish diseases have significant effects on society, particularly in by decreasing fish production, increasing costs, loss of livelihoods, reduced food security, etc. The main of this article is to review the environmental factors lead to oxygen deficiency, anoxia, its type, oxygen-depleting pollutants, emergence of different parasites, and risk to human health.

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Microorganisms for sustainable energy production: A plan for the future

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The existing energy consumption is projected to increase by around three times this century, and it is highly unlikely that fossil fuels will be able to provide this need, particularly given the rapid depletion of the fossil fuel resource. According to this present scenario, the energy demand in the future will be largely met by biofuel and bioenergy that are created by various bacteria. Due to limited conventional energy resources and increasing fossil fuel depletion, the world is experiencing a massive energy crisis. Thus, alternative renewable fuels are needed to meet the energy needs of a growing population and address environmental challenges and climate change like greenhouse gas emissions, global warming, air pollution, etc. Converting the chemical energy stored in organic compounds into electrical energy using microorganisms like bacteria has recently garnered a lot of attention. Eco-friendly biofuel production encompasses the creation of biodiesel, bioethanol, bio-butanol, and bio-hydrogen, while the purest form of bioenergy, bioelectricity, can be generated using microbial fuel cells (MFCs). Microbial fuel technology has the potential to be a cutting-edge alternative to traditional methods of renewable energy generation because of its dependability, efficiency, cleanliness, and the fact that it produces by-products that are either completely non-toxic or very little hazardous. There is a significant amount of carbon dioxide (CO₂) wasted during the synthesis of biofuels since so much power is needed to reduce carbon leftovers. Recent developments in metabolic engineering have quickened the manufacturing of biofuels such as fatty acids, alcohols, and gaseous derivatives, which may one day challenge the dominance of fossil fuels. Microorganisms' function in biofuel generation and engineering strategies are covered in this article. This review paper discusses the main methods and benefits of using bacteria to produce biofuels and bioenergy.

Keywords: Biofuel, bioenergy, eco-friendly, greenhouse gas, microbial fuel cells,



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