Shri Vile Parle Kelvani Mandal's

MITHIBAI COLLEGE OF ARTS, CHAUHAN INSTITUTE OF SCIENCE AND AMRUTBEN JIVANLAL COLLEGE OF COMMERCE AND ECONOMICS

Empowered Autonomous - Affiliated to University of Mumbai

NAAC Accredited A^{++} Grade, CGPA: 3.55 (November 2024)

Best College (2016-17), University of Mumbai

REGIONAL

Mumbai **y**oung **i**nvestigators' **M**eeting 2025-2026

IndiaBioscience

Crafting your Career (CYC) workshop

An initiative by IndiaBioscience

SCIENCE WITHOUT BORDERS

4th & 5th December 2025

COMPENDIUM OF ABSTRACTS

SHRI VILE PARLE KELVANI MANDAL'S
MITHIBAI COLLEGE OF ARTS, CHAUHAN INSTITUTE OF SCIENCE AND
AMRUTBEN JIVANLAL COLLEGE OF COMMERCE AND ECONOMICS
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In collaboration with IndiaBioscience,
Supported by Gujarat Biotechnology University and
Kishinchand Chellaram College

Regional Young Investigators' Meeting 2025-2026

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Compiled and Edited by:
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Dr. Shouriehebal Soni
Mrs. Gauri Acharya

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About Mithibai College

Mithibai College of Arts and Chauhan Institute of Science was established in 1961 by Shri Vile Parle Kelavani Mandal to address the growing need for institutions of higher education in the western suburbs of Mumbai.

With growing demand, Amrutben Jivanlal College of Commerce and Economics was instituted in 1981. The college has been granted linguistic minority status for the Gujarati community. From a modest two-storey building, the college has now grown into a nine-storey edifice that towers over the Juhu landscape. The college has 22 departments associated with the faculties of Arts, Science and Commerce. There are 16 Post Graduate programs and 10 Research Centres offering Ph.D. programmes. The college is a recipient of grants under Rashtriya Uchchatar Shiksha Abhiyan (RUSA-2), DBT and DST.

Mission

By strengthening the teaching-learning process through innovative practices, the institution will stimulate the spirit of scientific enquiry and discovery in academics. By providing state-of-the-art institutional infrastructure and excellent human resources the college will foster a better educational environment. The institute will also impart training in entrepreneurial and life skills for enhancing employability.

Vision

By strengthening the teaching-learning process through innovative practices, the institution will stimulate the spirit of scientific enquiry and discovery in academics. By providing state-of-the-art institutional infrastructure and excellent human resources the college will foster a better educational environment. The institute will also impart training in entrepreneurial and life skills for enhancing employability.

Objectives

- To hone students' focus and help them gain depth in their chosen area of study to achieve academic excellence.
- To enable them to prepare for lifelong learning by nurturing independent thinking.
- To sensitize the students towards the immediate environment and the society at large
- To provide a platform to actualize students' talents and encourage them to mould their passion into profession.

www.mithibai.ac.in

IndiaBioscience

About

IndiaBioscience is a program that fills a unique niche in the ecosystem of the life sciences in India, by being a catalyst to promote changes that affect the culture and practice of the field, through engagement with academia, government, and industry at various levels.

IndiaBioscience aims to increase the visibility of science in society, by being a hub for policy discussions, science communication, and as an aggregator of information. IndiaBioscience has been nurtured within the campus of the National Centre for Biological Sciences, Bangalore, but the mandate is broad-based in serving the life science profession across India.

Some of its activities over the past few years have been providing mentorship and facilitating recruitment of exceptional faculty through Young Investigators' Meetings, communicating new and exciting research via this website, provision of career resources for students and young professionals, and facilitation of research collaborations through specific programs. IndiaBioscience has also begun preliminary efforts towards addressing undergraduate science education in India.

IndiaBioscience is primarily funded by the Department of Biotechnology (DBT), Government of India. It is also funded by the Ministry of Human Resource Development (MHRD) and DBT/ Wellcome Trust India Alliance.

https://indiabioscience.org

Craft Your Career Workshop

Purpose, Value, and Format

The Crafting Your Career (CYC) workshop is a flagship capacity-building programme of IndiaBioscience, designed primarily for Master's students, PhD researchers, and postdoctoral fellows in the life sciences. Initiated in 2019, CYC was conceptualised to address a critical need in the Indian scientific ecosystem: greater awareness of the diverse and evolving career pathways available to life science graduates in the 21st century.

CYC workshops provide participants with focused, interactive, and practical training to help them identify their strengths, interests, and values and align these with informed career choices. The workshop empowers early-career scientists to build clarity about their professional goals and equips them with essential tools to navigate the modern science career landscape.

What participants gain-

CYC workshops offer a structured, hands-on learning environment where participants can:

- Explore diverse career options within and beyond academia.
- Map their skills, interests, and values to potential career paths.
- Build practical skills for job applications, including interpreting job ads and preparing effective CVs, resumes, and cover letters.
- Strengthen their professional communication, including networking (online and in-person), informational interviewing, and elevator pitching.
- Gain exposure to mock interviews, digital interview preparation, and career-building exercises tailored to real-world scenarios.

Participants also gain long-term access to a dedicated CYC online resource hub and become part of CYC community groups for continued learning, updates, and peer connections.

Evolution of the CYC workshops-

Since its launch, CYC has expanded into a widely accessed professional development initiative. The first CYC module focused on skill-building, networking, professionalism, and interactions with professionals across diverse sectors. Subsequent surveys assessing program impact have been published in the CYC Impact Analysis Report, underscoring its relevance and influence.

During the COVID-19 lockdown (2020–2022), CYC adapted seamlessly to online delivery. A series of IndiaBiostreams webinars introduced participants to topics such as research management, entrepreneurship, professionalism, facility management, interview preparation, and science communication. These virtual offerings broadened CYC's reach and provided flexible access to career-development training during a critical period.

Modules and format

CYC workshops typically consist of concise, interactive modules (each ~1 hour) covering:

- Foundation building: careers in science, mapping skills/interests/values, internships, informational interviews.
- Skill-building: understanding and developing transferable skills and strengths.
- Dissecting job advertisements: analysing job calls and crafting effective, PAR-based applications.
- CVs, resumes, and cover letters: understanding formats, functions, and writing strategies.
- Elevator pitches and interviews: preparing and practising interview skills.
- Networking, professionalism, and mentorship: cultivating networks, ethics, online conduct, and identifying mentors.
- Each module includes activities and exercises customised for in-person or online formats, ensuring high engagement and practical takeaways.

REGIONAL
Young
Investigators'
Meeting

Regional Young Investigators' Meeting (RYIM) Series

Genesis, Significance, and Format

Since 2009, IndiaBioscience has been organising the Young Investigators' Meeting (YIM) to convene outstanding young scientists, senior researchers, institutional leaders, and funding representatives for discussions on science, careers, and community building. Over the years, YIM has fostered a robust national network of life science researchers across India.

The tenth YIM in 2018 brought alumni from previous years together to reconnect, build collaborations, and share new ideas for developing their research programmes. During this gathering, participants recognised the need for similar but smaller, regionally anchored networks in areas with a high density of research institutions and scientific activity. Such networks could enable regular interactions, collaborative opportunities, and stronger scientific ecosystems at the local level. This insight led to the launch of the first Regional YIM (RYIM) in Hyderabad in 2018.

Why RYIM?

Regional YIMs extend the ethos of the national YIM, collaboration, openness, and peer support, into local scientific communities. They aim to:

- Build local networks of scientists and science professionals.
- Encourage regional collaborations across institutes and disciplines.
- Enable Young Investigators (YIs) to take on leadership roles in shaping their ecosystems.
- Promote diversity and representation in gender, scientific fields, institutional types, and demographics.

- Strengthen community culture, ensuring that early-career researchers have access to mentorship, partnerships, and peer learning close to home.

RYIMs are envisioned as YI-driven efforts that empower early-career researchers to lead, collaborate, and jointly address regional scientific challenges.

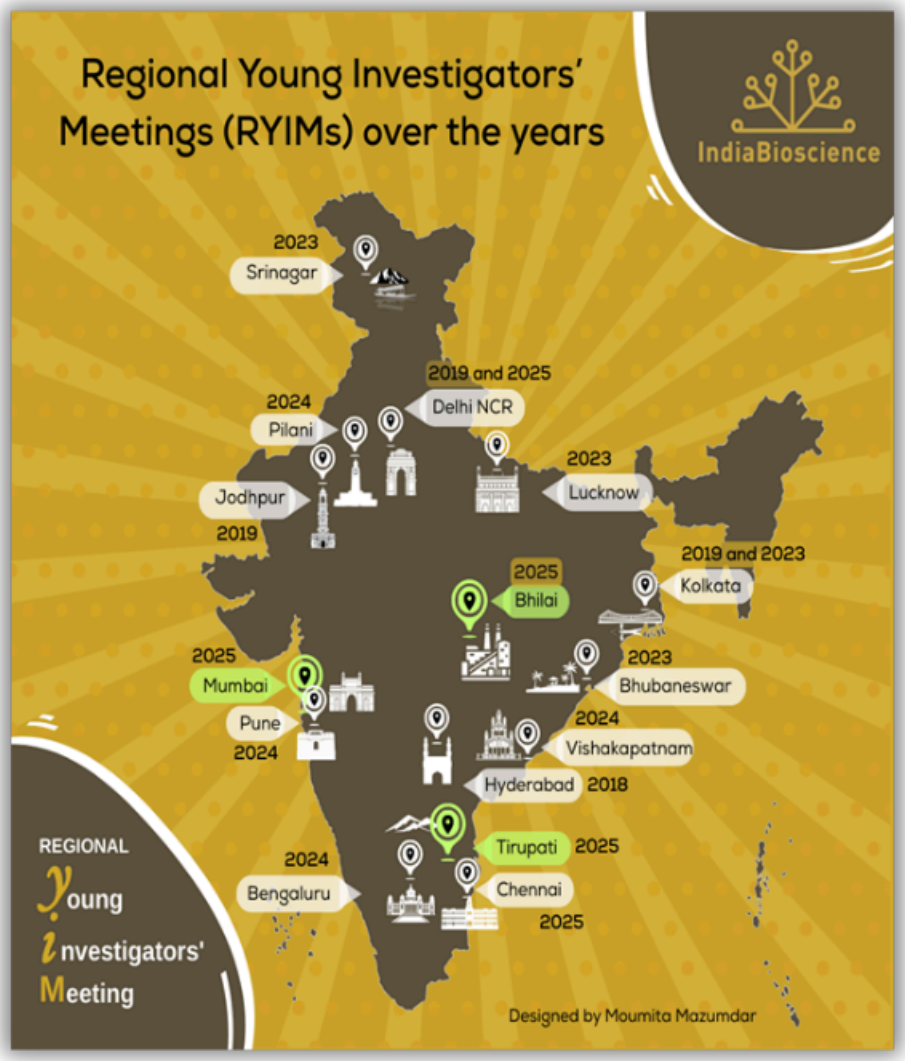
How RYIMs work

A Regional YIM is designed and organised by a team of 3–5 Young Investigators, led by a YIM alumnus who has previously attended a national YIM. Co-organisers can come from any research institute, university, or organisation in the region and need not be national YIM alumni. Teams are strongly encouraged to reflect diversity in gender, institutional representation, scientific expertise, and host institute types. RYIMs are in-person, 1–3 day meetings hosted at a local institute or university represented by one of the organisers. They bring together scientists, educators, and science professionals from across a region, broadly defined as North, South, East, West, Central, or North-East India, though other community-based boundaries are welcome. To support these meetings, IndiaBioscience provides:

- Seed funding up to INR 1.5 lakhs, and
- An optional INR 15,000 top-up for childcare grants under the IndiaBioscience-EMBO Childcare Grants Programme.

The Spirit of RYIM Grants

RYIM Grants encourage YIs to organise meaningful, collaborative, and enjoyable local meetings that strengthen scientific communities through teamwork, idea exchange, and shared leadership.



Cities where RYIMs have been held over the years. In 2025-26, three RYIMs are scheduled (marked green) in Bhilai, Mumbai and Tirupati.

Meeting Advisors

Prof. Krutika Desai
Principal
SVKM's Mithibai College
(Empowered Autonomous)

Dr. Hitesh Shingadia
Vice Principal (Research,
Consultancy and Collaboration
SVKM's Mithibai College
(Empowered Autonomous)

Organisers

Dr. Sharon D'Souza
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SVKM's Mithibai College
(Empowered Autonomous)

Dr. Mayuresh Joshi
Assistant Professor
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HSNC University, Mumbai

Dr. Kanti Kiran
Associate Professor
Gujarat Biotechnology University,
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Committee Members

Dr. Meeta Mathur
(Publicity and Marketing)

Dr. Shruti Kalani
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(Logistics & Finance)

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CA Janhavi Joshi
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(Registration & Certificates)

Ms. Vaishnavi Saravanaprasad
(Registration & Certificates)

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Mrs. Divya Chenna
(Stage & Documentation)

Dr. Devang Thakar
(Technical & Poster)

Mr. Sagar Gavas
(Technical & Poster)

Student Members

Sr. No.	Name	Course
1	Kritika Negi	MSc Part 2 Biotechnology
2	Kuhu Gautam	MSc Part 2 Biotechnology
3	Mosmi Patil	MSc Part 2 Biotechnology
4	Preet Parekh	MSc Part 2 Biotechnology
5	Mehfooza	MSc Part 2 Botany
6	Netra Shetty	MSc Part 2 Botany
7	Nia Diwecha	MSc Part 2 Zoology
8	Sujal Chaudhari	MSc Part 2 Zoology
9	Ronit Modi	MSc Part 1 Analytical Chemistry
10	Veena Suthar	MSc Part 1 Analytical Chemistry
11	Maitreyi Bane	MSc Part 1 Biochemistry
12	Akshat Agarwal	MSc Part 1 Botany
13	Rutisha Asodariya	MSc Part 1 Botany
14	Bhoomika Pardesi	MSc Part 1 Microbiology
15	Tanisi Mitra	MSc Part 1 Microbiology
16	Vaarin Gada	TYBFM
17	Atharva Mali	TYBSc Biotechnology
18	Deea Dhanania	TYBSc Biotechnology
19	Hiya Master	TYBSc Biotechnology
20	Veer Bhardwaj	TYBSc Zoology
21	Anusha Sharma	SYBSc Biotechnology
22	Dhanashree Pithwa	SYBSc Biotechnology
23	Vanshika Shah	SYBSc Biotechnology
24	Arjun Pillai	SYBSc Microbiology
25	Dev Chaudhary	SYBSc Microbiology
26	Gauri Naidu	SYBSc Microbiology
27	Keerat Kaur Sodhi	SYBSc Microbiology
28	Yash Kokate	SYBSc Microbiology
29	Aditya Dubey	SYBSc Zoology
30	Mrugank	SYBSc Zoology
31	Subha Nandula	SYBSc Zoology
32	Manan Shah	SYBSc Computer Science
33	Harkeerat Bhasin	FYBSc Computer Science

Shri Vile Parle Kelavani Mandal

The Societies's Registration Act, 1860 (No. 733 of 1934-35) and
The Bombay Public Trust Act, 1950 (No. F-30 (BOM) 1953)

Address: SVKM's NMIMS, 10th Floor (West Wing), V.L. Mehta Road, Vile Parle (West), Mumbai-400 056.

Amrish Patel
President

Message

As the President of Shri Vile Parle Kelavani Mandal, I am delighted to extend my heartfelt greetings to the organizers and participants of the Regional Young Investigators' Meet (RYIM) Mumbai 2025.

This Meet represents a remarkable platform for emerging researchers and academicians to exchange ideas, foster collaborations, and strengthen the fabric of India's scientific community. It is a celebration of curiosity, innovation, and the collective pursuit of knowledge -values that lie at the very core of academic and scientific progress.

At Shri Vile Parle Kelavani Mandal, we take immense pride in nurturing an ecosystem that encourages research, creativity, and interdisciplinary dialogue. Initiatives such as RYIM reflect our shared vision of empowering young minds and enabling them to contribute meaningfully to the nation's scientific and social advancement.

I am confident that over the course of the Meet, participants will engage in stimulating discussions, forge new partnerships, and gain perspectives that will enrich their academic journeys. The exchange of ideas among young investigators, mentors, and professionals promises to inspire a renewed commitment towards scientific growth and excellence.

I wholeheartedly commend the Organizing Committee for their meticulous efforts in bringing together such a dynamic forum. Your dedication and enthusiasm embody the true spirit of collaboration and learning.

On behalf of Shri Vile Parle Kelavani Mandal, I convey my warmest wishes for the resounding success of RYIM Mumbai 2025. May this gathering ignite inspiration, nurture connections, and pave the way for a future driven by scientific inquiry and shared purpose.

With warm regards and unwavering support,

Shri Amrish Patel
President,
Shri Vile Parle Kelavani Mandal

Registered Office: Shri Bhaidas Maganlal Sabhagriha Building, Bhaktivedanta Swaim Marg, Vile Parle (W), Mumbai - 400 056.
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Shri Vile Parle Kelavani Mandal

The Societies Registration Act, 1860 (No. 733 of 1934-35) and
The Bombay Public Trust Act, 1950 (No. F-30 (BOM) 1953)

SVKM's NMIMS New Building, 10th Floor, West Wing, V. L. Mehta Road, Vile Parle (West), Mumbai - 400 056.
Tel.: 4219 9999

Shri Shalin Divatia
Mentor, SVKM's Mithibai College
(Empowered Autonomous)

Message

As the Mentor of SVKM's Mithibai College, it is with immense pride and anticipation that I extend my warmest wishes to the entire team organizing the **Regional Young Investigators' Meet (RYIM) Mumbai 2025.**

This Meet convenes at an inspiring time when a new generation of scientists and researchers are redefining the frontiers of knowledge through collaboration and innovation. It reflects a collective effort to bring together some of these emerging and established researchers in a forum that encourages constructive dialogue and academic synergy.

SVKM's Mithibai College has always been committed to advancing research, fostering curiosity, and creating platforms that encourage intellectual discourse. Supporting RYIM Mumbai 2025 is a reflection of this vision – one that seeks to empower early-career investigators and provide them with opportunities to connect, learn, and lead.

Over the course of this Meet, I envision vibrant discussions, cross-disciplinary collaborations, and the spark of new ideas that will continue to illuminate the path of scientific progress. The confluence of emerging researchers and accomplished mentors promises to inspire innovation, strengthen networks, and build lasting partnerships that transcend institutions and disciplines.

I wholeheartedly commend the Organising Committee for their dedication and meticulous planning in bringing this significant initiative to fruition.

On behalf of **SVKM's Mithibai College,** I convey my best wishes for the success of **RYIM Mumbai 2025.** May it inspire a generation of young scientists to pursue knowledge with passion, purpose, and perseverance.

With warm regards and steadfast support,

Shri Shalin Divatia
Mentor,
SVKM's Mithibai College (Empowered Autonomous)

Message from Principal, SVKM's Mithibai College (Empowered Autonomous)

Prof. Krutika Desai
Principal
Meeting Advisor, RYIM Mumbai 2025

It is with immense pleasure that I extend my warmest wishes to the entire organising team of the Regional Young Investigators' Meet (RYIM) Mumbai 2025, to be hosted at SVKM's Mithibai College, in collaboration with IndiaBioscience.

This Meet represents a significant and timely initiative – a dynamic platform for early-career researchers, academicians, and professionals to come together, share their work, and engage in meaningful scientific dialogue. It reflects the spirit of collaboration and intellectual curiosity that drives the progress of science and innovation in our country.

As the Principal of SVKM's Mithibai College, I take great pride in our institution's continued efforts to promote research, nurture young talent, and support academic excellence. We are honoured to host RYIM Mumbai 2025, a flagship event of IndiaBioscience, that embodies these very values by empowering young investigators and fostering a community of shared learning and mentorship.

I am confident that the Meet will generate insightful discussions, encourage the exchange of ideas, and spark new collaborations that will extend well beyond the event. The diverse perspectives and expertise of participants promise to make this gathering a truly enriching experience for all involved.

On behalf of SVKM's Mithibai College, I convey my best wishes for the resounding success of RYIM Mumbai 2025. May this Meet inspire young minds to pursue research with passion, perseverance, and purpose, contributing meaningfully to the nation's scientific future.

With warm regards and best wishes

Message from Vice Principal, SVKM's Mithibai College (Empowered Autonomous)

Dr. Hitesh Shingadia
Vice Principal, SVKM's Mithibai College
(Research, Consultancy and Collaboration)
Meeting Advisor, RYIM Mumbai 2025

It gives me immense pleasure to welcome you all to this Regional Young Investigators' Research Meet on the theme 'Science Beyond Borders: Collaboration Across Disciplines for Global Impact.'

In today's interconnected world, the boundaries between disciplines are fading - and rightly so. The challenges we face, from climate change to public health, demand collaborative thinking that transcends traditional academic silos. This meet is a celebration of that spirit - where science becomes a bridge, not a boundary.

Whether you are from physics, biotechnology, economics, or the humanities, your research has the potential to contribute to global solutions. When disciplines collaborate, innovation accelerates, and impact multiplies.

Let this meet be a platform to share ideas, build networks, and spark interdisciplinary partnerships. Together, let us explore how science can go beyond borders - not just geographical, but intellectual - to create a better, more sustainable world.

Wishing you all a fruitful and inspiring research voyage.

Message from Director, IndiaBioscience

Siuli Mitra
Executive Director,
IndiaBioscience

IndiaBioscience's Regional Young Investigators' Meetings (RYIMs) are one of the many examples of how the organisation has shaped what it delivers to meet the community's needs. At the 10th gathering of the annual Young Investigators' Meeting (YIM) in Thiruvananthapuram in 2018, the community articulated the need for more such gatherings, underscoring the importance of having locally relevant conversations and having them more frequently than once a year. This also came from the recognition that we needed to reach more young investigators, researchers, and research professionals across the country. The RYIMs were thus born out of this need and have since created larger networks while deepening conversations around science funding, mentorship, research culture, equity in research, and other topics that, until 2018, were primarily limited to the annual YIM.

Since then, the RYIMs have met the growing need for peer networks, support systems, and interdisciplinary dialogue, playing a unique role in bridging institutions, sectors, and geographies. Previous meetings have initiated conversations on resource sharing, mentorship, science education, industry partnerships, DEI challenges in science, and specially curated skill-building workshops and networking sessions. These meetings have significantly strengthened IndiaBioscience's impact in supporting leadership, communication, and collaborative skills, especially during the critical first 10–15 years of a research professional's career. As RYIMs also complement IndiaBioscience's programmatic initiatives, this edition in Mumbai, co-curated and co-organised by Mithibai College of Arts, Gujarat

Biotechnological University, and Kishinchand Chellaram College, highlights the value of bringing science outside formal institutional boundaries.

Past RYIMs have shown that every region has its own scientific strengths, challenges, and opportunities, all of which can be leveraged to address local problems. RYIM Mumbai has been conceptualised with the theme "Science Beyond Borders," to create a space for local dialogues that ground national policies in the lived realities of funding, mentorship, and career development. To that end, the meeting will explore how interdisciplinary approaches followed by individuals and institutions for scientific problem-solving can lead to impactful outcomes. I hope the participants take advantage of this opportunity to meet and engage with one another. As they do so, I hope they remember that this is not intended to be a one-off engagement with IndiaBioscience or even with the colleagues they meet at RYIM Mumbai. When you walk up to your peers at the meeting, consider connecting with as many people as possible, especially those you haven't had a chance to meet before, and once you meet them, continue to show up even after the event ends.

I thank Sharon for taking the lead, and the other co-organisers for coming together to highlight industry links, startups, local universities, and colleges from three states. I hope the conversations over these two days go a long way in surfacing local challenges around research infrastructure, funding realities, talent pathways, and interdisciplinary niches.

While the team here has created a space for honest discussions around careers, mentorship, and leadership, IndiaBioscience hopes these conversations continue well beyond the meeting. With that, I would like to assure you that IndiaBioscience will remain a partner to both individuals and organisations attending the meeting in their efforts to empower researchers in the region.

I wish everyone a productive and meaningful RYIM in Mumbai.

Message from Director, Gujarat Biotechnology University

GUJARAT BIOTECHNOLOGY UNIVERSITY

(An initiative of Department of Science & Technology, Govt. of Gujarat)

MESSAGE

It is my great pleasure to welcome you to the Regional Young Investigators' Meeting (RYIM) 2025, Mumbai. This interdisciplinary flagship initiative serves as a platform where scientists and professionals converge to foster regional collaboration, scientific dialogue, and transformative research.

Biological research today stands at the forefront of innovation, offering immense potential to address global challenges in healthcare, environmental sustainability, and industry. Through collaboration and knowledge exchange, we can accelerate discoveries that meaningfully impact society and contribute to a better future.

This two-day conclave, hosted by Mithibai College under the theme *"Science without Borders: Collaborating across Disciplines for Global Impact,"* brings together young investigators, faculty, clinicians, industry leaders, and entrepreneurs from Goa, Gujarat, and Maharashtra. The meeting underscores the importance of interdisciplinary approaches in addressing complex scientific and societal issues while nurturing a dynamic regional research ecosystem.The forum features keynote lectures, panel discussions, and interactive sessions designed to strengthen linkages among academia, research institutions, and industry. Participants are encouraged to engage actively, exchange ideas, and establish enduring professional connections that transcend disciplinary boundaries.

Let this meeting serve as an opportunity to inspire one another, explore emerging technologies, and collectively chart new directions in scientific inquiry and innovation. I extend my sincere appreciation to the organizers, sponsors, and volunteers for their commitment and dedication in making this event possible. Their efforts in promoting interdisciplinary research and innovation deserve the highest commendation. I wish all participants a productive and intellectually stimulating experience, filled with meaningful discussions, valuable collaborations, and inspiring moments that advance our shared vision of a sustainable and progressive scientific future.

Warm Regards,

Dr Arun Bandopadhyay, FNASc, FNA
Director

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Message from Principal, Kishinchand Chellaram College

Prof. Tejashree V. Shanbhag
Dean, Faculty of Science and Technology,
HSNC University, Mumbai

I/C Principal & Head, Dept of Life Sciences,
Kishinchand Chellaram College, Mumbai

"Questioning is the most important thing. Curiosity has its own reason for existence." – Sir Albert Einstein

As we unveil this volume of abstracts, which showcases the intellectual rigor of our next generation of scientists, the above words of Sir Albert Einstein come to my mind. This innate drive of curiosity is the most potent catalyst for "Science without Borders" and the global impact we all aim to achieve.

It is with immense pride and enthusiasm that I extend a heartfelt welcome to all participants to the Regional Young Investigators Meeting – 2025. An event hosted brilliantly by SVKM's Mithibai College of Arts, Chauhan Institute of Science and Amrutben Jivanlal College of Commerce and Economics (Empowered Autonomous), in association with India-Bioscience. Kishinchand Chellaram College of HSNC University, Mumbai is honored to be the Co-Organizers for this Event. This collaboration underscores our shared commitment to fostering a dynamic, interconnected scientific community in the region.

The meeting's theme, “Science without Borders: Collaborating across Disciplines for Global Impact,” is, I believe a new mandate for contemporary research. The Abstracts in this volume vividly reflect this ethos, showing Young Investigators breaking traditional silos to explore the convergence of fields like AI in Life Sciences, Nanotechnology, and Precision Medicine. This multidisciplinary

fusion is not merely aspirational; it is the imperative tool we need to tackle complex, real-world challenges, from public health crises to food security.

The RYIM serves as a critical crucible for leadership and professional growth, far exceeding a mere data presentation platform. To the Young Investigators, Postdocs, and Research Scholars showcasing their work, I would say, use these two days to transition from passive learning to active network building. Engage in vigorous dialogue, challenge dogmas, and cultivate relationships that will evolve into career-defining collaborations. Groundbreaking science always emerges from the intersection of different perspectives, translating bench-side curiosity into profound societal impact.

Kishinchand Chellaram College of HSNC University, Mumbai applauds the energy and intellectual firepower gathered here. I encourage you all to utilize every opportunity, including the invaluable "Crafting Your Career" workshop, to hone not just your research skills, but your leadership acumen. May your discussions be insightful, your connections be enduring, and may this meeting serve as the catalyst for your most ambitious scientific endeavors.

I look forward to witnessing the global impact of the seeds of collaboration sown at RYIM Mumbai 2025.

Invited Speakers

Plenary Talk — Prof. Krutika Desai

Mentor Talk — Prof. Vidita Vaidya, Dr. Mukund Goswami, Dr. Deepak Modi, Dr. Jyoti Kode

Panel Discussion — Dr. Hitesh Shingadia, Dr. Subhojit Sen

Ice Breaking Session — Dr. Mayuresh Joshi

YI Alumnus Talk — Dr. Kanti Kiran

Industry Talk — Dr. Pranita Phatak, Ms. Sanchi Shah (Haystacks Analytics)

Publication Talk — Dr. Maneka Hoonjan

Special Talk — Dr. Siuli Mitra, Dr. Saurabh Bandhavkar

Plenary Talk

Prof. Krutika Desai
Principal, SVKM's Mithibai College
(Empowered Autonomous)

Communication to Control: Rewriting the rules of bacterial cooperation

Are social communication and cooperation exclusive to animals?

In fact, bacteria are also considered socially active organisms capable of communicating with each other and with their environment. Multiple forms of cooperation exist in bacteria, with the costs and benefits varying depending on the organism and environment. One well-studied mechanism is quorum sensing (QS), which certain bacteria use to synchronize and coordinate collective behaviours. Quorum sensing has been documented in numerous bacterial species. This complex, density-dependent molecular dialogue allows bacteria to regulate gene expression based on population size. By adjusting gene expression in response to cell density and the composition of the local community, bacteria adapt their behaviour collectively. Within QS, bacteria produce, release, and detect extracellular signalling molecules called autoinducers (AIs). As population density rises, AI concentrations increase. Bacteria detect these changes to modulate gene expression globally. Processes controlled by QS—such as bioluminescence, secretion of virulence factors, exopolysaccharide and exoenzyme production, antibiotic synthesis, and biofilm formation—are inefficient and costly for a single cell. QS phenomena are observed among plant, animal, and human pathogens. Both Gram-positive and Gram-negative bacteria possess QS systems. Gram-positive bacteria use oligopeptides and two-component systems to regulate gene expression via membrane-bound sensor kinases and cytoplasmic transcription factors, while Gram-negative bacteria employ an acylated homoserine lactone (HSL) autoinducer system.

Increasing antibiotic resistance poses challenges for treating both common and complex infections. According to the ICMR's 2024 annual report, 'the Antimicrobial Resistance & Surveillance Network (AMRSN)', third-generation antibiotics are rapidly losing effectiveness against common bacterial infections most frequently associated with hospitals.

It is today's need to rewrite the rules of bacterial communication by means of controlling communication among them to counter antibiotic resistance.

QS inhibition(QSI) represents a promising strategy for developing novel anti-QS agents. Achieving QS inhibition can be accomplished through various mechanisms. Various approaches can be used for QS inhibition, such as inhibiting signal synthesis, controlling signalling pathways. Disruption of the QS system potentially decreases expression of virulence factors, prevents or disrupts the biofilm. QSI is a promising approach to control bacterial infections. Many potent QSI agents, both natural and synthetic, have been identified, and more research is needed to explore the full potential of this strategy in combating bacterial infections.

Keywords: Quorum sensing, HSL, QSI

Mentor Talk 1

Prof. Vidita Vaidya
Scientist and Chairperson,
Department of Biological Sciences,
Tata Institute of Fundamental Research,
Mumbai

Choosing a research topic - How that matters!

Mentor Talk 2

Dr. Mukunda Goswami
Principal Scientist & Head
Genetics and Biotechnology Division
Indian Council of Agricultural Research-
Central Institute of Fisheries Education,
Mumbai

Smart Protein as a Novel Food for Global Community

The entire world is looking for a sustainable and climate resilient food production system as alternative food needs to be searched for 10 billion people by 2050. In view of this, the importance of developing cultivated meat has been growing up tremendously over the last few years. This has raised the need of more research and development leading towards cultivated seafood production. Although a significant amount of basic research has been conducted in the recent past on cultivated meat, most of it is focused on animals such as cow, pig and chicken and less on fish which is another important source of animal protein. Hence, need of the hour is to develop and characterize appropriate cell types required for cultivated seafood development. Recently, ICAR-Central Institute of Fisheries Education, Mumbai initiated research on cultivated seafood through an international project for the first time in India. Muscle cell lines have been developed from many popular fish species and myocytes and adipocytes isolated from these cell lines have been used for gene expression studies to understand myogeneis and adipogenesis. The insights from these cell lines would be useful for development of lab grown meat - cultivated seafood as smart proteins in near future. Based on the experiences gained over the years in the subject, the opportunities and challenges in cultivated seafood development including current status as a smart protein are illustrated in this presentation.

Mentor Talk 3

Dr. Deepak Modi
Scientist G and Head
Molecular and Cellular Biology Laboratory
ICMR-National Institute for Research in Reproductive and Child Health (NIRRCH), Mumbai

From cells to code: Why AI is Matters for your Scientific Journey

Biology is undergoing profound transformation. For decades, discovery was driven mainly by bench science involving pipettes, gels, microscopes, and careful observation. While this foundation remains essential, but today it sits alongside a new partner: artificial intelligence. We now work in laboratories where cells and code coexist, and where models can learn patterns from biological data in ways that complement human intuition.

AI is not a replacement for biologists, but is a tool that expands what biologists can't do. AI systems can fold proteins, interpret health records, predict molecular interactions, and examine datasets at a precision and speedy that once overwhelmed us. More importantly, they help us frame better questions that we could not imagine to ask earlier.

But AI is not perfect. It carries the assumptions and biases of its training data, and it requires human curiosity, skepticism, and ethical judgment. One does not need to become a programmer to work with AI. We do need is an ability to think critically, interpret outputs, and integrate computational insights with biological understanding. The most impactful scientists of our generation will be those who can move fluidly between the bench and the algorithm, between experiments and models.

Through examples from molecular biology and health care, we will explore how AI accelerates discovery while keeping the human scientist at the centre. My hope is that we see AI not as a shortcut or replacement but as a thoughtful companion that helps to explore life's complexity with greater depth, speed, and imagination.

Mentor Talk 4

Dr. Jyoti Anand Kode
Scientific Officer G,
Principal Investigator, Kode Lab,
Tumor Immunology & immunotherapy
Group at ACTREC, Tata Memorial Centre,
Kharghar

Think out of the Box: Innovations in Immunology for improved Healthcare

I am delighted to be part of the Regional Young Investigators' Meet (RYIM-2025) organized by the Research and Development Cell of Mithibai College in collaboration with IndiaBioscience. It's the first of its kind event and provides an excellent platform for increasing the visibility of science in society through science communication amongst young investigators, faculty, scientists, senior Ph.D./postdoctoral researchers, clinicians, educators and industry. I extend a warm welcome to all the participants of the RYIM event in Mumbai from 4th to 5th of December, 2025.

I would like to congratulate R &D Cell of Mithibai College to come up with this unique thought to bring young minds together to excel, innovate and network to achieve higher goals.

Mentoring by experts in the field can ignite young minds to enable intra- and inter-institutional collaborative projects that are resourceful for students, postdoctoral fellows and faculty.

Since decades science has always evolved due to failure of few experiments or by results from accidental discovery. Innovation is the mantra. All earlier discoveries by great scientists actually happened because they pursued failures, or unexpected results leading to novel outcomes for improved health care. I would cover

similar stories from past and also delve upon how my research, landed up in few innovations. The dedication and relentless efforts of the organizing committee and faculty in preparation for this exciting Meet are highly appreciated. I hope participants will enjoy the scientific journey shared by few, basic and translational research data alongwith discussions, and develop new professional interactions through this event.

Panel Discussion

Dr. Hitesh Shingadia
Vice Principal
SVKM's Mithibai College
(Empowered Autonomous)

Dr. Subhojit Sen
Assistant Professor
School of Biological Sciences
CEBS, University of Mumbai

Ice Breaking Session

Dr. Mayuresh Joshi
Assistant Professor
Kishinchand Chellaram College,
HSNC University

YI Alumnus Talk

GUJARAT BIOTECHNOLOGY UNIVERSITY

(An initiative of Department of Science & Technology, Govt. of Gujarat)

Cross talk between fundamental and applied research: A scientific journey continued

Though science beyond boundaries implies more on transdisciplinary collaborations and strategies to develop products for the benefit of "One health". Interdisciplinary programs and research within a comprehensive discipline still could be implemented with immense scope to perform science with sustainable solutions. In the lead of scientific advancement, biological research presents exceptional chances to tackle urgent global issues. Bioresearch has the power to transform diverse areas of science in several ways, including improvements in healthcare, food security, environmental sustainability, industrial applicability and influence humankind's welfare. Rather from being a rigid contradiction, fundamental and applied science constitute an interconnected cycle in which they endlessly update and affect one another. While translational research applies fundamental discoveries to produce useful solutions, such as novel medications, diagnostics, devices, products and methodology, fundamental research seeks to increase knowledge and comprehension of the underlying principles.

Plant biology and agricultural biotechnology extend much beyond crops that provide either food or fiber and is constrained only by existing scientific knowledge and technology to harness their benefits. Nevertheless, a paradigm change has occurred in the technology landscape for understanding plant biology and bio-engineering technologies

My topic in this event, covers research discoveries of fundamental importance on model plants to utilizing the learnings in staple crops with a garnish of modern technology for improved varieties combating stress and physiological barriers. This goes with bridging the gap of basic and translation R&D through emerging technologies to understand plant physiology and developmental biology-led climate-neutral-resilient plant systems. The aim is to outreach the current generation of young researchers to understand the gap areas and plan science that addresses problem statements whether beyond boundaries or within a comprehensive discipline.

Warm Regards,

Dr. Kanti Kiran, (PhD)
Associate Professor

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Gujarat International Finance Tec-City (GIFT city),
Gandhinagar, Gujarat -382355, INDIA

Industry Talk 1

Dr. Pranita Phatak
Assistant Vice President (Program)
Society for Innovation & Entrepreneurship
SINE IIT Bombay

Translating Ideas into Impact: Bridging Science and Entrepreneurship through Incubation

Translational research is increasingly shaping the global innovation landscape by enabling scientific discoveries to evolve into tangible solutions that address real societal needs. In biotechnology, this shift is evident through breakthroughs such as rapid point-of-care diagnostics, scalable biomanufacturing systems, and advanced biomaterials—many of which began as academic ideas and matured into successful startups. These examples highlight the necessity for research and entrepreneurship to advance in parallel, grounded in problem statements informed by clinicians, industry, and the pharmaceutical ecosystem. Aligning research with market and societal needs ensures that innovation remains both relevant and impactful.

This session, "Translating Ideas into Impact: Bridging Science and Entrepreneurship through Incubation," emphasizes the critical role of incubators in guiding this journey. By providing structured mentorship, modern infrastructure, regulatory insight, and access to funding networks, incubators enable researchers to navigate the complex path from laboratory discovery to commercialization. For students, this presents a powerful opportunity: the ability to transform their ideas into startups that can generate employment, contribute to national innovation priorities, and create strategic, social, and economic impact.

By adopting a translational and entrepreneurial mindset early in their careers, students can position themselves not only as researchers but as innovators capable of shaping the future.

Industry Talk 2

Ms. Sanchi Shah
Head, Bioinformatics
Haystacks Analytics

HaystackAnalytics
Leader In Genomics

Career and Advances in Bioinformatics

In the era of digital transformation, bioinformatics has become indispensable for both research and career development, marking a paradigm shift from traditional in vivo and in vitro methods to predominantly in silico approaches.

With omics data exploding at unprecedented rates and petabytes of data accumulated globally, specialized tools, multi-omics approaches and AI/ML empowers “next-generation scientists” to uncover patterns hidden in decades of archives.

Publication Talk

Dr. Maneka Hoonjan
Associate Editor,
Springer Nature (India)

Navigating the Research Ecosystem: Publishing, Visibility, and Career Pathways

In today's rapidly evolving research landscape, young investigators face both unprecedented opportunities and complex challenges. The journey from generating ideas to disseminating them widely requires not only scientific rigor but also strategic navigation of the publishing ecosystem. My reflections for this gathering stem from the conviction that research excellence must be paired with effective communication, visibility, and thoughtful career planning.

Publishing remains the cornerstone of academic life, yet the process can feel daunting for early-career researchers. Choosing the right journal is not simply about impact factors—it is about aligning your work with the audience most likely to benefit from it. A well-structured manuscript, clear in its objectives and transparent in its methods, is the strongest foundation for successful peer review. Peer review itself, while sometimes challenging, is a collaborative process that strengthens scholarship and builds resilience.

Beyond publication, visibility is increasingly vital. Research that remains confined to journals risks being overlooked in a crowded ecosystem. Social media platforms, conference presentations, and professional networks offer powerful avenues to amplify your work, foster collaborations, and engage with diverse audiences. Metrics—whether citations, altmetrics, or qualitative feedback should be seen not as ends in themselves, but

as indicators of how research resonates and contributes to broader conversations.

Equally important is the question of career pathways. Identifying a research niche allows young investigators to carve out a distinctive identity in academia. At the same time, opportunities beyond traditional research roles—such as editorial positions, science communication, or publishing careers—are expanding. At Springer Nature, for instance, editorial careers provide a unique vantage point to shape the dissemination of knowledge and support the global research community.

The Regional Young Investigators Meet, hosted by SVKM'S Mithibai College in association with IndiaBioscience 2025 initiative embodies the spirit of mentorship, collaboration, and empowerment. It is a reminder that science thrives not in isolation but in dialogue between disciplines, across borders, and among generations. To the young investigators participating in this meet, I encourage you to embrace curiosity, cultivate resilience, and remain open to diverse pathways. Your contributions will not only advance knowledge but also inspire the next wave of discovery.

Special Talk

Dr. Saurabh Bandhavkar
Associate Director, Medical Information
and Scientific Communications
(Global & US), AstraZeneca

Scientific Communication and Leadership Beyond the Lab

As scientific careers continue to expand beyond traditional academic paths, researchers are increasingly exploring opportunities in pharmaceutical companies, biotech startups, regulatory bodies, science communication, consulting, and other allied sectors. In these diverse environments, strong communication and leadership skills become essential—both for working effectively across disciplines and for building meaningful collaborations. This talk will explore how young investigators and early-career researchers can develop and apply these skills to strengthen their impact and navigate careers within and beyond the laboratory.

In today's scientific ecosystem, technical expertise alone is no longer sufficient. As research grows more interdisciplinary, the ability to translate complex ideas for varied audiences—clinicians, commercial teams, policymakers, patients, and the general public—has become a core professional competency. Clear scientific communication helps researchers advocate for resources, secure funding, disseminate findings widely, and drive broader adoption of their work. Similarly, leadership is increasingly defined not by seniority but by one's capacity to influence, mentor, inspire, and build shared vision within teams of diverse backgrounds.

This presentation will highlight practical strategies for cultivating these essential skills. Topics will include developing

confident scientific storytelling, adapting communication styles to different stakeholders, and leveraging digital tools to enhance visibility and impact. It will also examine how early-career researchers can lead from where they are- whether through initiating collaborations, managing small projects, mentoring junior colleagues, or contributing to institutional initiatives. Real-world examples from industry and academia will illustrate how effective communication and leadership can accelerate career progression and open doors to unconventional pathways.

Finally, the talk will provide actionable guidance for researchers considering transitions into roles beyond the bench. By understanding the expectations of non-academic settings, building a strong professional narrative, and demonstrating both scientific rigor and interpersonal agility, young scientists can position themselves competitively across a wide range of careers. Attendees will leave with a clearer understanding of how to harness their unique strengths, communicate their value, and shape fulfilling scientific careers in an evolving global landscape.

Schedule for Regional Investigators Meet Mumbai 2025

Day 1

Venue: Juhu Jagruti Hall (JJH) Mithibai College

Tentative Time	Speakers/Activity
8:00 AM – 9:00 AM	**Registration and Breakfast (Breakfast in Multipurpose Room No. 101)**
9:00 AM – 10:00 AM	**Inaugural session** **Chief Guest:** Hon. Col. Prof. Dr. Hemlata K. Bagla, Vice chancellor, HSNC University **Guest of Honor**: Dr. Jayant P. Gandhi, Secretary, SVKM
10:00 AM – 10:30 AM	**Plenary talk:** **From communication to control: Rewriting the rules of bacterial cooperation** Prof. Krutika Desai, Principal, SVKM's Mithibai College (Empowered autonomous)
10:35 AM – 11:00 AM	**Mentor talk 1: Choosing a research topic - How that matters!** Prof. Vidita Vaidya, TIFR
11:00 AM –11:15 AM	**Tea break and networking**
11:20 AM – 11:45 AM	**Mentor talk 2: Smart Protein as a Novel Food for Global Community** Dr. Mukunda Goswami, Central Institute of Fishery Education
11:50 AM – 12:20 PM	**Panel Discussion: Collaboration as the Catalyst for Scientific Progress** Led by Dr. Hitesh Shingadia, Vice Principal (Research Consultancy & Collaboration), SVKM's Mithibai college (Empowered autonomous) **Guest panelists:** Dr. Subhojit Sen, School of Biological Sciences CEBS
12:20 PM – 12:40 PM	**Icebreaker session: A small activity to foster communication between participants and mentors** Dr. Mayuresh Joshi, Kishinchand Chellaram College, HSNC University
12:45 PM – 1:45 PM	**Lunch (Multipurpose Room No. 101)**
1:50 PM - 2:10 PM	**YI alumnus talk: Cross talk between fundamental and applied research: A scientific journey continued by** Dr. Kanti Kiran, Ghandhinagar, Gujarat
2:15 PM – 4:15 PM (Parallel sessions of oral & poster)	**Poster presentation session (5 mins + 2 mins Q&A)** Presented by Research scholars (Foyer area) **Oral presentation session (10 mins + 2 mins Q&A)** Presented by Young investigators (JJH & Seminar Hall)
4:15 PM – 4:30 PM	**Tea break and Networking**
4:35 PM – 5:00 PM	**Industry talk: Translating Ideas into Impact: Bridging Science and Entrepreneurship through Incubation** Dr. Pranita Phatak, SINE IIT Bombay
5:05 PM – 5:30 PM	**Navigating Scientific Publication: Navigating the Research Ecosystem: Publishing, Visibility, and Career Pathways** Dr. Maneka Hoonjan, Springer Nature (India)
End of Day 1	

Schedule for Regional Investigators Meet Mumbai 2025

Day 2

Venue: Juhu Jagruti Hall (JJH) Mithibai College

Tentative Time	Speakers/ Activity
8:00 AM – 9:00 AM	**Breakfast (Multipurpose Room No. 101)**
9:00 AM – 9:25 AM	**Mentor talk 3:** **From cells to code: Why AI Matters for your Scientific Journey?** Dr. Deepak Modi, ICMR - NIRRCH
9:30 AM – 9:55 AM	**Mentor talk 4:** **Think out of the Box: Innovations in Immunology for improved Healthcare** Dr. Jyoti Kode, ACTREC
10:00 AM – 10:25 AM	**Special talk 1: Scientific Communication and Leadership Beyond the Lab by Dr.** Saurabh Bandhavkar, AstraZeneca (Online)
10:30 AM – 10:45 AM	**Tea break and Networking**
10:45 AM – 11:15 AM	**Special talk 2:** **Engaging communities, Enabling change** by Dr. Siuli Mitra, IndiaBioscience
11:20 AM – 12:00 PM	**Ask us anything session** Interaction of PhD students and young researchers with mentors on varied topics
12:05 PM – 12:15 PM	**Industry talk 2:** **Career and Advances in Bioinformatics by** Sanchi Shah, Head, Bioinformatics, Haystacks Analytics
12:20 PM – 1:25 PM	**Lunch (Multipurpose Room No. 101)**
1:30 PM – 2:10 PM	**Valedictory** **Chief Guest:** Dr. Ramesh Bhatt, Vice Chancellor, SVKM's NMIMS Deemed-to-be University **Guest of Honor**: Shri. Asoke Basak, Advisor to the President, SVKM
2:15 PM – 5:15 PM	**Craft-Your-Career Workshop (CYC workshop) Venue: JJH** **Selected participants, with a mix of Research scholars, PhD scholars & Faculty:** Dr. Siuli Mitra, IndiaBioscience
5:20 PM – 6:20 PM	**High Tea and Networking**
End of Day 2	

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List of Abstracts

Sr. No.	Title of the Poster Abstract	Category	Code No.	Page No.
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21	**Impact of Parasitism on Phytochemical Profile: Quality Control and HPTLC Assessment of Cuscuta reflexa and its Host, Ziziphus jujuba.** - *Shakti Singh Rathore, Aqil Badrudin Samnani, Aditya Zarapkar, Mayuresh Joshi*	Postgraduate and Undergraduate Learners	P 21	60-61
22	**Inducer and Rice Bran Optimized B. subtilis Serine Protease for Gluten Hydrolysis** - *Aaisha Ansari, Aarti Dulam, Komal Nirmal, Punita Jain*	Postgraduate and Undergraduate Learners	P 22	62
23	**Influence of Mid-Range Sound Frequencies (250 Hz–1200 Hz) on the Proliferation of Staphylococcus aureus** - *Charu Gupta, Kinjal Vasani, Siddhi Sharma, Pooja Mehta*	Postgraduate and Undergraduate Learners	P 23	63

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33	**Unmasking PCOS: How Hormones, Lifestyle, and Nutrition Shape Women's Health** - *Misbah Badgujar, Riva Vinde, Saloni Jai, Shouriehebal Soni, Hitesh Shingadia*	Postgraduate and Undergraduate Learners	P 33	74-75

Oral Abstracts
by
Young Investigators

A Tale of Two Barrels: Import of synthetic β-barrels into yeast mitochondria

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ABSTRACT

Introduction: Outer membrane β-barrel proteins are encoded in the nucleus, translated in the cytosol, and finally targeted and imported into the respective organelles. Detailed studies have uncovered the mechanisms involved in the import of mitochondrial β-barrel proteins and identified the targeting signals and the cytosolic factors that govern their proper biogenesis.

Objectives: Recently, *de novo* designed synthetic 8 stranded β-barrel proteins (Tmb2.3 and Tmb2.17) were shown to fold and assemble into synthetic lipid membranes. To better understand the general aspects of the biogenesis of β-barrel proteins, we investigated the fate of these artificial proteins upon their expression in yeast cells.

Methods: We cloned the codon optimised artificial beta barrels in yeast expression vectors and expressed them in wild type and mutant yeast strains. We further employed drop dilution assays, subcellular fractionations, protease protection assays, alkaline extraction, blue native/SDS PAGE and western blotting to assess their localisation, membrane integration and assembly.

Results: We demonstrate that although these proteins are *de novo* designed and are not related to *bona fide* mitochondrial β-barrelproteins, they were targeted to mitochondria and integrated into the organelle outer membrane.

Conclusion: Absence of a single import receptor did not impair the biogenesis of the artificial β-barrel proteins. However, we observed a strong dependency on the TOB/SAM complex.

Application: Ultimately, we assess whether such interactions are critical and evolutionarily conserved for the optimal biogenesis of β-barrel proteins.

Keywords: β-barrel proteins, *de novo* designed proteins, mitochondria, outer membrane, TOB complex

Biogenic silver and silver oxide hybrid nanoparticles as a potent antimicrobial against multi drug-resistant *Pseudomonas aeruginosa*

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ABSTRACT

Introduction: There is a need for inexpensive and eco-friendly methods to produce biocompatible nanoparticles in the field of medicine to treat Multi Drug Resistant (MDR) organisms.

Objectives: The objective was to produce silver nanoparticles (AgNPs) and study its antimicrobial activity against MDR *Pseudomonas aeruginosa.*

Methods: UV-visible spectroscopy, dynamic light scattering (DLS), X-ray diffractometry (XRD), scanning electron microscopy (SEM) and high resolution transmission electron microscopy (HRTEM) was used to analyze the AgNPs. The biosynthesized AgNPs were tested for antimicrobial activity against MDR *P.aeruginosa*. The zone of inhibition of AgNP impregnated filter paper discs was compared with various commercially available antibiotic discs, alone and in combination with AgNP. A checkerboard assay was performed to check the synergistic action between the AgNPs and the drugs.

Results: UV-visible spectroscopy showed an absorption peak at approximately 420 nm. The DLS and SEM micrographs showed spherical particles ranging between 10 and 50 nm in size. XRD indicated the presence of silver and silver oxide phases identified from the diffraction peaks. The crystallite sizes of silver (Ag) were smaller than those of silver oxide (Ag_2O), indicating a possible core shell structure, validated by the SEM and TEM studies. Most of the commercially available antibiotic discs did not inhibit the growth of the MDR strain alone or in combination with AgNP. The synergistic action was found to be the best between the AgNPs and Carbenecillin drug against the MDR hospital isolate.

Conclusion: The efficacy of this combination proved to be a lethal and viable option against the MDR *P. aeruginosa*.

Application: Exploring nano-biotechnology in therapy could improve patient care and reduce the copious amounts of potent antimicrobials administered thereby reducing the incidence of drug resistance through multi directional antimicrobial action.

Keywords: AgNPs, *P.aeruginosa*, synergism, antimicrobial

Deciphering genome-wide regulation of translation in eukaryotes through integrative functional genomics approaches

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ABSTRACT

Introduction: Cells dynamically regulate protein synthesis to support growth and environmental adaptation. Translation initiation is a key control point in this process, requiring the scanning of mRNA 5′ UTRs by the translation machinery to locate the start codon. 5′UTR structures can impede this scanning mechanism and thus the action of 'unwinders' RNA helicases are required.

Objectives: To determine genome-wide roles of RNA helicases namely eIF4A, Ded1, and Dbp1 in regulating translation initiation across the yeast transcriptome, and to determine how these helicases compensate or cooperate during translation initiation in living cells.

Methods: Interdisciplinary approaches of Molecular Biology, Biochemistry, Genetics and Genomics, including Translation Complex profiling, Ribo-seq, RNA-seq were employed which allowed high-resolution mapping of ribosome positions and assessment of global translational efficiency.

Results: Ded1 is essential for scanning through mRNAs with highly structured 5'UTR, while eIF4A supports translation across most mRNAs. Dbp1, a paralog of Ded1, partially compensates for reduced Ded1 function, indicating functional redundancy. Together, the three helicases form a flexible regulatory network that enables efficient translation at genome-wide level even when mRNA structures pose challenges.

Conclusion: eIF4A, Ded1, and Dbp1 coordinate to ensure accurate, efficient translation in eukaryotic cells, supporting optimal protein synthesis under environmental conditions.

Application: This work reveals key mechanistic roles of RNA helicases in maintaining the efficiency and fidelity of translation, informing studies on cancers, metabolic and neurological disorders driven by aberrant translation, and highlighting RNA helicases as promising therapeutic targets.

Keywords: RNA helicases, Translational control, Ribosome profiling, RNA structures

Impact of Ulvanobiuronic acids (ulvan) as a protective measure against bisphenol A induced growth inhibition and oxidative stress parameters in *Lactobacillus casei*

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ABSTRACT

Introduction: Gut-microbiome are facing increasing amount of chemical insult owing to the deteriorating quality of food, food packaging and potable water. Supplementation of diet with marine algae derived Ulvanobiuronic acids might prevent such harmful impacts to human health.

Objective: The present research unravels impact of Ulvanobiuronic acids as a protective measure against common food contaminant; bisphenol A induced growth inhibition and oxidative stress on Lactobacillus casei.

Methodology: To test the hypothesis, *Lactobacillus casei* was incubated with various concentration of ulvan and BPA. The impact of BPA and ulvan was measured on the growth kinetics, oxidative stress parameters and various free radical scavenging activities.

Results: The results showed effect of BPA on *L. casei* is highly dynamic and represents the impact in concentration as well as time dependent manner. The quantity of ulvan, higher than 0.25 % (W/V), showed significantly reduced for 24 hours incubation period, however the rate increased in 48 and 72 hours. A positive correlation was noted between the concentration of BPA and reducing sugars in the medium. Both DPPH free radical scavenging activity, and Cupric ion reducing activity (CUPRAC) were increased in a concentration dependent manner in all the experimental groups.

Conclusion: The results suggest a possible role of ulvan for preventing BPA induced oxidative damage in *Lactobacillus* sp. via neutralizing free radicals and preventing cell damage.

Application: The study is further exploring identification of key metabolites and candidate genes associated with specific signaling pathways, to decipher mechanism of action of BPA toxicity in *Lactobacillus* sp.

Keywords: Antioxidant, Glutathione, Functional foods, Superoxide dismutase, Probiotics.

Insights into the impact of oral contraceptives on the feminization of male fish *Oreochromis niloticus* (Linnaeus, 1758)

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ABSTRACT

Introduction: Municipal wastewaters have been known to contain estrogenic endocrine disrupting chemicals, such as estradiol and similar synthetic compounds found in oral contraceptives. These compounds are known to contribute to feminization of wild fish populations throughout the world across freshwater and marine systems. EDCs on exposure can induce female specific traits in male fish including high concentrations of Vitellogenin which is a protein typically restricted to the female population.

Objectives: to investigate the phenomenon of feminization in male *Oreochromis niloticus (tilapia)* through vitellogenin induction as a biomarker.

Methods: *Oreochromis niloticus* were obtained and acclimated for 21 days in an environment similar to its natural habitat. The fish were treated with oral contraceptive compound- estradiol for a period of 90 days, and blood serum was analysed for Vitellogenin levels using standard clinical biochemical procedures.

Results: The male tilapia subjected to the EDC showed a significant elevation in the VTG levels indicating an estrogenic mediated feminization occurrence.

Conclusion: VTG synthesis in male tilapia show a high level of sensitivity of the fish to environmental estrogens. It also emphasizes the potential for hormonally active pollutants to disrupt sexual differentiation in aquatic organisms.

Application: The study emphasises the need for more improved waste water treatments to reduce the environmental load of pharmaceuticals. The study proposes the use of VTG as a reliable biomarker for assessing the aquatic pollution caused by estrogenic compounds.

Keywords: Estradiol, Endocrine disruptor, Tilapia, Vitellogenin, Biomarker

Mapping market dynamics and socioeconomic constraints in Mumbai's coastal Finfish supply chain

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ABSTRACT

Introduction: The present study aims to assess the market dynamics and socioeconomic constraints within the coastal finfish supply chain of major landing centres in Mumbai, focusing on the roles of fishermen, wholesalers, retailers, and consumers across Sassoon Dock, Versova, and New Ferry Wharf. The study highlights underlying structural inefficiencies, profit disparities, and challenges such as overfishing, market monopolies, and seasonal fluctuations.

Objectives: To analyse the market dynamics of the finfish supply chain along different landing centres in Mumbai; To identify socioeconomic constraints across stakeholder groups.

Methods: Primary data were collected by conducting on-field interviews using structured questionnaires across the three selected landing centres which was later analysed and processed further to draw conclusions. Qualitative and quantitative data on costing, multifaceted markting channels, operational constraints and income patterns of stakeholders were recorded.

Results: Findings revealed significant considerable disparity In profit distribution, with fishermen earning the smallest share due to operational expenses and dependence on existing market structures. Wholesalers and intermediaries dominated price setting, while retailers struggled with quality, storage, and competition. Seasonal variations and resource-related stress further contributed to market uncertainty.

Conclusion: The findings highlight the need for restructuring Mumbai's finfish supply chain to rectify profit inequities, strengthen infrastructural support, and mitigate pressures arising from unsustainable harvesting practices. Enhancing data-informed management, establishing transparent

pricing systems, and ensuring fair market access are critical for improving fishery-community livelihoods and securing long-term resource sustainability.

Application: The findings provide information for future policy interventions, promote sustainable fishing practices, and enhance the overall resilience of the fishery industry in Mumbai, thereby contributing to the broader objectives of economic growth, sustainable and inclusive development of the sector. The identified constraints and value-chain gaps can help policymakers, stakeholders, and local governing bodies in formulating strategies that improve efficiency, curb exploitative practices, and promote sustainable fisheries management across Mumbai's coast.

Keywords: Supply chain, finfish, Mumbai, socioeconomic constraints

Morphological and Structural Evaluation of Hybrid Bioplastic Materials: A Pilot Study

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ABSTRACT

Introduction: Plastic pollution is a major global concern, and as the world is becoming more environmentally conscious, people prefer opting for sustainable and environment friendly options. However, most of the commercially available alternatives are neither made from 100% natural materials nor are they biodegradable or sustainable economically. The current bioplastics available in the market, even when produced from biologically sourced raw materials, are non-biodegradable put additional pressure on agriculture for production of raw materials. Additionally, they are not easily decomposed and need additional infrastructure to be created to do the same. This highlights the need for a genuinely green, affordable, and scalable bioplastic alternative.

Objectives: to design and characterize a bioplastic packaging material that can fill the gap in the market for an affordable and green solution for logistic and packaging requirements for the industry to replace single-use conventional polyethylene packaging.

Methods: Formulation of biopolymer matrix, Structural analysis was conducted to examine surface morphology and intermolecular interactions using Scanning Electron Microscopy (SEM) and Fourier Transform Infrared Spectroscopy (FTIR). Also, a three-month shelf-life study was conducted along with ASTM D570 test.

Results: The structural analysis using SEM and FTIR provided results point towards successful integration of the raw materials. The preliminary analysis of 3 months shelf-life study showed no signs of degradation and absence of microbial growth. Additionally, ASTM D570 test, revealed minimal water absorption by the biomaterial.

Conclusion: The study demonstrates that a mucilage-based biopolymer incorporated with multiple plants and animal extracts can serve as a promising biodegradable and sustainable alternative to conventional single use polythene packaging. The characteristics of the hybrid bioplastic make it an ecofriendly option while also addressing the limitations of the commercially available plastics.

Applications: Can be used as a single use alternative in food, retail and consumer goods industries.

Keywords: Bioplastic, Mucilage, SEM, FTIR, Single-use plastic

Piperine Ameliorates Adverse Effects of Therapy-Induced Senescence in Breast Cancer by Attenuating cGAS-STING pathway

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ABSTRACT

Introduction: Breast cancer is one of the most common cancers affecting women worldwide. Major challenge faced is that of recurrence majorly due to chemotherapy that leads to therapy-induced senescence (TIS) state wherein there is permanent cell growth arrest. In this state, senescent cells secrete pro-inflammatory cytokines known as senescence-associated secretory phenotype (SASP) that promotes tumour progression by modulating surrounding tumour microenvironment. Further, these senescent cells upon rejuvenation can lead to more aggressive and malignant tumour behaviour. To reduce cancer recurrence targeting these SASP could be a therapeutic strategy. The cGAS-STING pathway activation is triggered by cytoplasmic chromatin fragments (CCFs) and majorly drives SASP and release of IL-6 and IL-8 in senescent cells. Piperine which is derived from Piper nigrum (black pepper) is a natural alkaloid and known for its anti-inflammatory and antitumour properties. However, its effect on doxorubicin-induced senescent breast cancer cells is unexplored.

Objective: The current study was focussed to investigate the senotherapeutic potential of Piperine in Doxorubicin-induced senescent breast cancer cells.

Methods: The effect of Piperine on SASP was studied on doxorubicin-induced senescent breast cancer cells MCF-7 and MDA-MB-231 by measuring its IL-6 and IL-8 mRNA and protein expression levels. Through western blotting the cGAS-STING pathway was evaluated for effect of Piperine on STING phosphorylation and confirm its non-senolytic effect. To study Piperine's effect on cancer cell migration and invasiveness, transwell and co-culture assays were performed.

Results: Our studies showed effective suppression of SASP by Piperine that reduced the expression of IL-6 and IL-8, both at the mRNA and protein levels

in MCF-7 and MDA-MB -231by modulating the cGAS-STING pathway. The effect was due to reduction in the phosphorylation of STING protein that prevented activation of this pathway, thereby reducing the production of proinflammatory cytokines.

Conclusion: Selective targeting of cGAS-STING pathway by Piperine reduced pro-inflammatory SASP demonstrating its senomorphic action.

Application: Piperine holds promise as a novel senotherapeutic agent to disrupt tumour microenvironment and hinder cancer progression.

Keywords: H3K27me3, H3K9me3, CCF, Senescence, Piperine, cGAS-STING, breast cancer.

Species inventory and biological aspects of selected species of the family Clupidae landed on Sasson dock, Mumbai

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ABSTRACT

Introduction: The present study documents a comprehensive species inventory and analyses the biological aspects of selected Clupeid fishes occurring at Sassoon Dock, Mumbai. Three species *Anodontostoma chacunda, Sardinella albella*, and *Pellona ditchela* were selected for detailed biological study, focusing on their food and feeding behaviour and reproductive biology.

Objective: To make a species inventory of clupeids occurring at Sasson Dock, To Examine the food and feeding behaviour and reproductive biology of the selected fishes to find out their dietary preference and Gonadal Development and Spawning patterns.

Methodology: The identification of species was performed following the guidelines and keys provided in the FAO Species Identification Guide. The Index of Relative Importance (IRI) was calculated by using the formula: IRI= (%N+%V) %F. Gastro-Somatic Index (Ga SI) was also assessed as using the formula. Ga SI = Total weight of gut contents (Food)/ Total wt. of fish 100.Qualitative and quantitative analyses of the stomach contents were carried out following the points method described by Hynes.

Results: species inventory was made of A total of 16 species belonging to 10 genera and five subfamilies ,Stomach content analysis revealed species-specific feeding preferences: *A. chacunda* primarily consumed foraminiferans, *S. albella* fed mainly on zooplankton and *Acetes spp*, while *P. ditchela* exhibited a dominant preference for *Acetes spp.* Reproductive studies indicated varying gonadal maturity stages, with *A. chacunda* exhibiting the highest Gonado-somatic Index, suggesting proximity to the spawning season.

Application: This research represents the first detailed documentation of Clupeid diversity and biology from Sassoon Dock, providing vital insights for sustainable fisheries management and conservation of pelagic resources along the Mumbai coast.

Keywords: Clupeidae, Sassoon Dock, feeding Behaviour, Reproductive Biology

Standardization and Hepatoprotective Activity of *Clitoria ternatea* L. Leaves

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ABSTRACT

Introduction: *Clitoria ternatea* L., which belongs to family Fabaceae is widely been recognized for treating hepatic disorders, otalgia and skin eruption. The plant is commonly called as Aparajita or Shankapushpi. Despite of its ethnobotanical relevance, it is necessary to lay out the pharmacognostical and phytochemical studies to ensure the quality and efficacy.

Objectives: The study aimed to evaluate the pharmacognostical, phytochemical and pharmacological analysis of *C. ternatea* leaves. The antioxidant and in-vitro hepato-curative studies will reveal the potential efficiency of the said drug.

Methods: For standardization of the said plant drug, the following parameters are studied viz. macroscopic, microscopic, and powder analyses. In addition to this Physicochemical parameters, HPTLC, antioxidant, and *In-vitro* hepatocurative assays were also performed as per the standard protocols.

Result: Microscopy showed unique characteristic features like sclerenchyma ring around the vascular bundle and two bicellular non-glandular trichomes—smooth-walled with curved apex and warty-walled with blunt apex—along with wax crystalloids on the leaf surface. Physicochemical evaluation recorded total ash (8.15%), water-soluble ash (6.58%), acid-insoluble ash (1.88%), and sulphated ash (9.05%). Water-soluble extractives (14.92%) were higher than alcoholic (9.66%). Phytochemical studies confirmed alkaloids, saponins, anthraquinone glycosides, terpenoids, and flavonoids. HPTLC revealed taraxerol (126.7 µg). Antioxidant activity displayed an IC_{50} of 1409.8 µg/mL, while hepatocurative tests demonstrated reduced SGOT, SGPT, and LDH levels compared to control.

Conclusion: The present findings will contribute to establishing pharmacopoeial standards for the said plant part.

Application: The study supports its inclusion in the herbal sector for its hepatocurative potential.

Keywords: *Clitoria ternatea* L., Fabaceae, pharmacognosy, HPTLC, antioxidant, hepatoprotective, phytochemical screening.

Suppression of Oxidative Stress and Chronic Inflammation by UNIM-H, a Polyherbal Unani Formulation

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ABSTRACT

Introduction: Chronic inflammation and oxidative stress play significant roles in the initiation and progression of degenerative, autoimmune, and musculoskeletal illnesses, including arthritis. Excessive generation of reactive oxygen species (ROS) and prolonged inflammatory reactions cause cellular damage, lipid peroxidation, and DNA instability, emphasising the need for safer and more effective treatment approaches.

Objective: This study looked at the phytochemical profile, antioxidant, anti-inflammatory, antimicrobial, and in vivo efficacy of the polyherbal formulation UNIM-H, which contained hydroalcoholic extracts of *Aloe barbadensis* Mill., *Chrysanthemum indicum* L., *Commiphora mukul* Engl., *Convolvulus scammonia* L., *Ipomoea turpethum* L. and *Merendera persica* Boiss.

Methods: HPTLC profiling, colorimetric assays for measurement of antioxidant potential, FTIR analysis for functional group analysis and ELISA analyses were performed for the measurement of anti- and pro-inflammatory cytokines.

Results: HPTLC profiling revealed the presence of bioactive chemicals such as aloe-emodin, colchicine, quercetin, and guggulsterone Z, indicating pharmacological potential. Antioxidant assays (DPPH, ABTS, FRAP, nitric oxide scavenging and malondialdehyde) revealed significant free radical neutralisation and prevention of lipid peroxidation. FTIR research revealed hydroxyl, carbonyl, and phenolic groups that are related with antioxidant and anti-inflammatory properties. In vivo investigations using CFA-induced arthritis, carrageenan paw oedema and cotton pellet granuloma models revealed substantial decreases in paw swelling and granuloma weight, which

were equivalent to indomethacin. ELISA analysis showed lower levels of TNF-α, IL-1β, IL-2, IFN-γ, and PGE_2, whereas IL-10 and IL-4 production increased.

Conclusion: UNIM-H has strong antioxidant, anti-inflammatory, and therapeutic properties.

Application: UNIM-H can be used as a natural treatment for arthritis and associated inflammatory illnesses.

Keywords: Antiarthritic, Antioxidant, UNIM-H, HPTLC, Phytochemical, Cytokines and CFA-induced arthritis model.

Oral Abstracts
by
Research Scholars

A Preliminary Account on Distributional Record of *Peristylus plantagineus* (Lindl.) Lindl. in Maharashtra

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ABSTRACT

Introduction: *Peristylus* is a species of terrestrial orchid belongs to family Orchidaceae. It is restricted to the Indian subcontinent, specifically found in India, Nepal & Sri Lanka (Extinct). In total 29 species and 2 varieties of *Peristylus* exist in India, out of this 6 species are found in Maharashtra.

Objectives: The current study aims to understand the distributional record of *Peristylus plantagineus* (Lindl.) Lindl.in Maharashtra particularly under moderately open places, small bushes, along the forest edges of moist & dry deciduous, semi-evergreen forest.

Methods: The extensive literature reviews, field surveys, data from herbaria & field/ forest dwellers were collected to enrich the documentation and understand the distribution ofTongue orchid in Maharashtra.

Results: The study undertaken in 6 Administrative Divisions namely Amaravati, Aurangabad, Konkan, Nagpur, Nashik & Pune along with 36 Districts reveals that the species is present in all the 5 Divisions in 13 Districts except Aurangabad division.

Conclusion: Due to the remote location, locality & misinterpretation of the species, *Peristylus plantagineus* (Lindl.) Lindl. falls under the DD (Data Deficient) threat category in regional assessment at The IUCN Red List of Threatened Species.

Application: The study contributes the critical insights on distribution, conservation, threat, baseline data for biodiversity monitoring of *Peristylus plantagineus* (Lindl.) Lindl. in Maharashtra.

Keywords: P*eristylus plantagineus*, Plantain *Peristylus*, Tongue orchid. Jivha pushpa, Orchidaceae, Distribution, Maharashtra.

A study on Fecundity and Ova Frequency Polygon of *Chirocentrus dorab* (Forsskål, 1775)

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ABSTRACT

Introduction: The present study investigates the fecundity and ova frequency polygon of *Chirocentrus dorab* (Dorab wolf herring), the largest clupeid fish inhabiting inshore and brackish waters. Breeding season runs from April to October, with peak spawning from April to June or even September.

Objectives: To understand the reproductive biology of *C. dorab* through the Ova frequency polygon and fecundity.

Methods: The female fish samples were collected from the Malad fish market during July-October 2025. Morphometrics and ovary length-weight were measured, and the ovaries were stored in 10 % NBF (Neutral Buffered Formalin). The frequency polygon was carried out with the help of an ocular lens and calibrated using the stage micrometre for the actual ova diameter.

Results: A single 74 cm (1.585 kg) specimen demonstrated an absolute fecundity of 182,897 ova, with a relative fecundity of 115.59 ova/g. Analysis of 2,389 ova showed diameters ranging from 65.28 µm to 126.48 µm, with a single frequency peak observed in the 101.28-107.28 µm class range.

Conclusion: Studies show *Dorab* (*C. dorab*) has high fecundity, which increases with fish length. Research in the Gulf of Mannar (2006-2008) recorded about 60,268 eggs from a 58.7 cm fish, while a Malaysian study also linked larger size (68-67 cm) to higher egg counts. Since Dorab provide no parental care, this high fecundity is a critical survival strategy.

Application: Understanding the reproductive biology, to avoid fishing during peak spawning season for the sustainability of the species, as it is commonly observed in local fish markets of Mumbai.

Keywords: Wolf-herring, Reproductive Biology, Fecundity, Ova-diameter.

Effect of colchicine on Plant Morphology and Anatomy of *Solanum melongena*

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ABSTRACT

Introduction: *Solanaceae* is one of the largest and important plant family. It features many popular and important vegetable crops belonging to three major genera namely; *Capsicum, Solanum* and *Physalis*. Many of its members are referred to as the drug plants. Plants of this family are rich in alkaloids, which can be used in various traditional medicinal systems such as; Ayurveda, Homeopathy, Unnani, Sidha and Traditional Chinese Medicine. S*olanum melongena*, commonly known as the eggplant, belongs to the family *Solanaceae*. Colchicine is a naturally occurring plant-based alkaloid. Colchicine is said to be highly mutagenic in nature and functions as a "mitotic poison". In this research, the effect of different concentration of colchicine on the plant has been studied.

Objectives: Study of change in number of stomata in leaf and increase in number of layers and enlargement of cortical cell in stem by using different concentration of Colchicine in *Solanum melongena.*

Methods: Different concentrations of Colchicine solutions i.e.,0.25% and 0.125% were used, with the aim to study the difference in the changes of the anatomical and morphological characters of stem and leaf.

Results: The transverse section of the stem showed increase in the number of layers and enlargement of the cortical cells. Transverse section of the leaf there was little to no change noted, except increased in the number of layers collenchymatous cell and increase in number of stomata.

Conclusion: This research explain the significant effects of colchicine on the morphology and the anatomy of the species – *Solanum melongena*. In every experiment two replicates were used. The Experiment findings show that 0.25% of Colchicine treated *Solanum melongena* plants showed best results, the species treated with 0.25% Colchicine showed great difference in the plant height which was 52 cm before treatment increased to 68 cm, the plant width

changed from 25 cm to 40 cm, leaf length from 19cm to 27 cm and leaf breadth from 12 to 20 cm. The number of stomata which were 13 in control went up to 32, epidermal cells from 82 in control to 180 on upper epidermis.

Application: To create new stable variety and enhance desirable traits improved characteristics and accelerate breeding.

Keywords: *Solanaceae*, *Solanum melongena*, Colchicine, Ploidy, Mutagenic Effects.

Extracellular secretion of triterpene Squalene in engineered *Yarrowia lipolytica* through process engineering

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ABSTRACT

Introduction: Squalene, a linear triterpenoid with wide-ranging applications in pharmaceuticals, cosmetics, nutraceuticals, and biofuels, has gained considerable attention for sustainable microbial production. Recently, *Yarrowia lipolytica* has been extensively engineered for production of squalene. However, intracellular accumulation of squalene is a major limitation for its microbial production, as it can trigger feedback inhibition, exert cytotoxic effects, and complicate downstream recovery.

Objectives: The current work aims at enabling extracellular secretion through bioprocess engineering.

Methods: *Y. lipolytica* was metabolically engineered for squalene production through CRISPR-Cas9 and subjected for bioprocess optimization. Further, in-situ product recovery (ISPR) approach was applied for extracellular secretion and recovery of squalene in fermenter.

Results: Integration of ISPR approach resulted in extracellular squalene fraction of 0.73 g/L with intracellular squalene titer of 2.78 g/L. Thus, the total squalene titer reached 3.51 g/L with productivity of 29.25 mg/L/h and yield of 70.17 mg/g of glucose. Application of ISPR enabled the secretion of ~20% of total squalene into the extracellular phase, resulting in an improvement of volumetric productivity to 29.25 mg/L/h in a bioreactor.

Conclusion: The ISPR approach enabled secretion of ~20% of total squalene into the extracellular phase leading to a 2.2-fold enhancement in overall productivity.

Application: This work paves the way for enabling sustainable and scalable squalene production in microbial host.

Keywords: Squalene, *Yarrowia lipolytica*, In-situ product recovery, Extracellular secretion, Metabolic engineering

Green synthesis and characterization of Cobalt nanoparticles using *Acacia Catechu* extract for application in dye-sensitized solar cells

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ABSTRACT

Introduction: A sustainable substitute for traditional chemical synthesis, which frequently uses hazardous chemicals and challenging circumstances, is green nanotechnology (Iravani, 2011). *Acacia catechu* L. functions as a natural reducing and capping agent due to its high flavonoid and polyphenol content (Singh et al., 2020). Because of their optical, magnetic, and catalytic characteristics, cobalt nanoparticles (CoNPs) are of great interest for renewable energy devices such as dye-sensitized solar cells (DSSCs) (Li et al., 2019).

Objectives: The objective of this work is to use *Acacia catechu* L. extract to synthesis cobalt nanoparticles, describe them using contemporary analytical methods, and assess their performance in DSSCs.

Methods: Cobalt ions were reduced to nanoparticles using Catechu's aqueous bark extract. To verify form, size, and crystallinity, the produced CoNPs were examined by XRD, SEM, TEM, and EDS (Raut et al., 2013).

Results: The creation of CoNPs stabilized by plant biomolecules was verified by characterization. While FTIR spectra showed functional groups in charge of reduction and stabilization, XRD patterns showed nanoscale crystallinity.

Conclusion: The process provides an economical and environmentally responsible way to create cobalt nanoparticles with a consistent shape and high stability.

Application: When used as a photoanode in DSSCs, the produced CoNPs showed improved light absorption and increased photo-conversion efficiency (Patil et al., 2022).

Keywords: Green synthesis, *Acacia Catechu* L., SEM, TEM, EDS

Green synthesis of metal oxide nanoparticles from *Tradescantia pallida* leaf extract

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ABSTRACT

Introduction: Biosynthesis of metal oxide nanoparticles using plant extracts is gaining attention for its sustainability, cost-effectiveness, and environmental compatibility. *Tradescantia pallida* leaves are rich in phytochemicals, which play pivotal roles in nanoparticle reduction and stabilization.

Objectives: To synthesize metal oxide nanoparticles, specifically Copper Oxide & Cobalt Oxide, using *Tradescantia pallida* leaf extract. To characterize the nanoparticles for size, shape, and stability. To assess the antibacterial and antioxidant activities of the synthesized nanoparticles.

Methods: It includes collection and preparation of *Tradescantia pallida* leaf extract. Followed by Synthesis: Mixing the plant extract with copper salt solution, followed by incubation, Characterization: Performed using UV–Vis spectroscopy, FTIR, XRD, SEM and Biological activity evaluation through standard antibacterial and antioxidant assays.

Results: Successful formation of Copper Oxide & Cobalt Oxide nanoparticles demonstrated by color change and spectral analysis. The synthesized nanoparticles showed promising antibacterial and antioxidant activities against selected microbial strains.

Conclusion: Green synthesis utilizing *Tradescantia pallida* leaf extract provides a reliable, non-toxic method for producing functional metal oxide nanoparticles with valuable biomedical properties.

Application: Potential applications include antimicrobial coatings, drug delivery, and environmental remediation due to the enhanced biological properties of the synthesized nanoparticles.

Keywords: Green synthesis. Metal oxide nanoparticles, *Tradescantia pallida*, Copper Oxide nanoparticles, Cobalt Oxide nanoparticles, Antibacterial activity, Phytochemicals, Eco-friendly synthesis

Pharmacognostic and phytochemical evaluation of the leaves of *Thevetia peruviana* (Pers.) K. Schum.

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ABSTRACT

Introduction: *Thevetia peruviana* (Pers.) K. Schum., commonly known as yellow oleander, belongs to the family Apocynaceae L. Watson & M.J. Dallwitz. It is an ornamental and medicinal plant known for the presence of bioactive constituents such as cardiac glycosides, flavonoids and alkaloids. Owing to its therapeutic potential and toxic nature, pharmacognostic and phytochemical evaluation is essential to establish its identity and purity.

Objectives: To carry out detailed pharmacognostic studies and preliminary phytochemical screening of the leaves of *Thevetia peruviana* to provide diagnostic characteristics and establish quality parameters.

Methods: Macroscopic and microscopic studies of leaves were performed. Leaf architecture and epidermal features were examined. Physicochemical parameters including moisture content, ash values and extractive values were determined. The aqueous extract was subjected to preliminary phytochemical screening and quantitative estimation of major phytoconstituents such as flavonoids, phenols and tannins. Thin Layer Chromatography (TLC) was carried out. In-vitro antioxidant activity was evaluated using DPPH assay.

Results: The type of venation is pinnate camptodromous and stomata are anomocytic. Pharmacognostic analysis revealed distinctive leaf features. Phytochemical tests confirmed the presence of alkaloids, flavonoids, tannins, saponins, phenols, etc. The aqueous extract exhibited significant antioxidant activity.

Conclusion: The study provides comprehensive pharmacognostic and phytochemical data useful for the authentication and standardization of *Thevetia peruviana* leaves.

Application: Findings support the potential use of the aqueous leaf extract in herbal formulations and as a natural antioxidant source in pharmaceutical research.

Keywords: *Thevetia peruviana*, pharmacognostic evaluation, aqueous extract, phytochemical screening, antioxidant activity.

Pharmacognostic Characterization and Quality Assessment of *Delonix regia* (Bojer ex Hook.) Raf. Flowers

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ABSTRACT

Introduction: The medicinal properties of the Gulmohar (*Delonix regia* (Bojer ex Hook.) Raf) have been well established for centuries. In traditional medicine many parts of this plant have been used for an extended period of time to treat a variety of medical problems. Specifically, the flowers of the Gulmohar plant have long been recognized for their therapeutic and nutritional value. Currently, however, there are no scientific studies that adequately support these claims. The objective of this research project was therefore to create detailed pharmacopeial standards for the flower of the Gulmohar plant.

Objectives: To establish a comprehensive set of pharmacognostic standards for the flower of the Gulmohar (*Delonix regia*) plant through an examination of its organoleptic and macroscopic characteristics, as well as through micro- and histochemical analyses. The project also includes an evaluation of the Gulmohar flower based on physicochemical tests and a phytochemical screening of all the individual components of the flower and of the entire flower.

Methods: The fresh flower of the Gulmohar plant was examined to develop the organoleptic and macroscopic, followed by the microscopic study and histochemical studies of the flower. After developing the standards based on the organoleptic and macroscopic characteristics, the physicochemical tests for moisture content, ash, and extractable values were conducted using common laboratory methods. Flavonoid screening was also performed and a record of the fluorescence on the flower parts was kept.

Results: Microscopic examination of the plant revealed that the epidermis is composed of a single layer of cells and has a waxy cuticle, that the parenchyma contains both anthocyanin pigment and starch grains, oil droplets, and resin ducts, and that the histochemical tests concluded the same

for the major components of the plant (carbohydrates, proteins, tannins, flavonoids, alkoloids, terpenoids) as did the phytochemical tests. In addition, moisture content18 ranged from the lowest value of 8.6% to the highest value of 10.5% and total ash from the lowest of 2.7% to the highest of 4.5%. The methanolic extract demonstrated a higher degree of extractability ranging from 30.0 - 38.3% compared to other solvents. Overall, phytochemical screenings of the plant showed the presence of carbohydrates, proteins, tannins, flavonoids, alkaloids, and terpenoids.

Conclusion: The results presented here constitute the development of pharmacopeial standards for the flower of *Delonix regia*, thus providing the necessary scientific basis for the historical applications of the flower as an herbal medicine. This research provides significant progress toward establishing the validity and standardization of *Delonix regia* as a possible herbal drug.

Application: The development of the pharmacopeial standards for the flower of *Delonix regia.*

Keywords: *Delonix regia*, Pharmacognosy, Phytochemical Screening, Microscopy, Histochemistry

Synthetic reprogramming of *Yarrowia lipolytica* for bacterial collagen bioproduction through precision fermentation

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ABSTRACT

Introduction: Collagen, a vital structural protein, has extensive applications in biomedicine, cosmetics, and materials science. However, its extraction from animal sources necessitates a sustainable alternative. Recombinant collagen (rCollagen) offers a promising solution, but its production requires scalable methods to meet industrial demands.

Objectives: This study leverages *Yarrowia lipolytica*, a robust host for recombinant protein production, to express bacterial collagen-like proteins Scl2 and Sbl1 from Streptococcus pyogenes and *Solibacter usitatus*, respectively.

Methods: CRISPR-Cas9 technology was used to integrate the genes Scl2 and Sbl1 in *Yarrowia lipolytica*. Recombinant strains XScl2 and XSbl1 were constructed and validated. Small-scale fermentation experiments were conducted to assess protein expression. Collagen-like proteins were analyzed using SDS-PAGE and biochemical assays to quantify production.

Results: Both XScl2 and XSbl1 strains successfully expressed recombinant collagen. Preliminary fermentation achieved titre of 0.3 mg/L and 0.27 mg/L.

Conclusion: These findings highlight the potential of *Y. lipolytica* as a host for bacterial collagen production; however, further optimisation of purification protocols is necessary to achieve higher yields and purity. Our ongoing research focuses on enhancing protein expression, secretion efficiency, and refining purification strategies to establish a scalable and sustainable production process for bacterial collagen.

Application: A scalable *Y. lipolytica* platform for rCollagen production has potential applications in biomaterials, cosmetics, textiles, regenerative medicines, and sustainable collagen alternatives.

Keywords: Bacterial collagen, *Yarrowia lipolytica*, CRISPR-Cas9, protein purification

Trace Level Nitrosamine Analysis in Varenicline Drug Product by LC-MS/MS

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ABSTRACT

Introduction: Regulatory agencies require the identification of certain contaminants at trace levels to ensure the safety and quality of medicines.

Objective: This study aimed to develop, optimize, and validate a highly sensitive and robust LC–MS/MS method for the simultaneous quantification of six nitrosamines- N-Nitroso Varenicline (NNV), N-Nitrosodimethylamine (NDMA), N-Nitrosodiethylamine (NDEA), N-Nitrosodiisopropylamine (NDIPA), N-Nitrosodibutylamine (NDBA), and N-Nitrosoethylisopropylamine (NEIPA) in varenicline tablet formulations.

Methods: Chromatographic separation was performed using an Inertsil C18 column (150 mm × 4.6 mm, 5 µm) with a gradient elution method with variable flow rate. The detection was performed using an LC-MS/MS system integrated with an APCI source operating in positive ion mode. The method was validated in accordance with regulatory guidelines, which included tests for linearity, sensitivity, accuracy, precision, and specificity.

Results: The method exhibited excellent linearity ($R^2 > 0.99$) for all analytes, with low limits of detection and quantification adequate for trace-level monitoring. Recoveries in varenicline tablets ranged between 80% and 120%, indicating acceptable accuracy. The total run time was 30 minutes, with no significant matrix interference observed.

Conclusion: The validated LC-MS/MS method showed high sensitivity, selectivity, and accuracy in detecting six nitrosamine contaminants in varenicline tablets.

Application: This method is suitable for routine quality control, batch release testing, and comprehensive risk assessment of nitrosamines in varenicline drug products, aligning with current regulatory safety requirements.

Keywords: Varenicline, LC-MS/MS, N-Nitroso Varenicline, NDSRI, APCI.

Unlocking the secrets of the cap: essential role of RNA capping enzyme Triphosphatase in *Toxoplasma gondii* transcript stability and survival

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ABSTRACT

Introduction: *Toxoplasma gondii* is a zoonotic pathogen and the causative agent of toxoplasmosis. A central feature of its survival and pathogenicity is the remarkable adaptability to diverse host environments, stress cues, and immune challenges, achieved through finely tuned gene expression regulation. Multiple regulatory layers including transcription initiation, RNA processing, translation, and post-translational modifications act in concert to sustain parasite growth and differentiation. Among these, an understudied but fundamental hallmark of eukaryotic gene expression is the covalent attachment of a 7-methylguanosine (m^7G) cap at the 5′ end of RNA polymerase II transcripts. This modification stabilizes transcripts, prevents degradation, facilitates splicing, promotes nuclear export, and recruits translation initiation factors. While indispensable in higher eukaryotes, the mechanistic basis and biological importance of m^7G capping in T. gondii remains understudied.

Objectives: Characterization of mRNA capping pathway of *T. gondii.*

Methods: The study identified three candidate enzymes responsible for sequential steps in cap formation: TgCet, an RNA triphosphatase; TgCeg, a guanylyltransferase; and TgCmt, an m^7G methyltransferase. Structural and biochemical analyses placed TgCet within the triphosphate tunnel metalloenzyme (TTM) family, a distinct class compared to metazoan and plant RNA triphosphatases.

Result: Stepwise enzymatic assays demonstrated that TgCet, TgCeg, and TgCmt together generate functional m^7G-capped RNAs, which were efficiently recognized by *T. gondii* eIF4E, validating their role in translation initiation. Conditional depletion of TgCet using an auxin-inducible degron system resulted in reduced m^7G levels in parasite, transcriptional dysregulation, and irreversible arrest of parasite replication. Cap-sequencing

revealed that highly expressed genes, particularly those linked to metabolism, division, and virulence, were disproportionately affected. Importantly, TgCet depletion in a mouse model conferred complete protection against lethal toxoplasmosis. We next explored whether TgCet represented a viable therapeutic target by evaluating two compounds- Myricetin and 3,4-dicaffeoylquinic acid (3,4-diCQA) for TgCet inhibition. Both compounds significantly reduced TgCet activity but in cell-based assays, only Myricetin effectively suppressed parasite growth.

Conclusion: Together, the findings provide the first comprehensive insight into the mRNA capping machinery of *T. gondii*, establish TgCet as an essential regulator of parasite viability and virulence, and highlight RNA triphosphatase as a promising therapeutic target.

Application: TgCet is essential for *T. gondii* survival and virulence, making the parasite-specific mRNA capping pathway a promising drug target. The ability of small molecules—especially Myricetin—to inhibit TgCet highlights its potential for developing new therapies against toxoplasmosis.

Keywords: *Toxoplasma gondii*, Triphosphatase, mRNA capping, cap sequencing, therapeutic target.

Utricularia lazulina P. Taylor (Lentibulariaceae): A new distributional record for Ratnagiri district, Maharashtra, India

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ABSTRACT

Introduction: Ratnagiri, a coastal district in the Konkan region of Maharashtra was explored for the Genus Utricularia from the Katradevi lateritic plateaus between 2022 to 2025. During the floristic investigations on the lateritic plateau, *Utricularia lazulina* P. Taylor was recorded as a new addition to the Ratnagiri district. This species is endemic to Western Ghats, representing a new addition to the district's flora. The paper provides a detailed description, with herbarium specimen numbers and photographic documentation of the collected species.

Objectives: The major objective of the current study is to put-forth the extended distribution record for *U. lazulina* P. Taylor from Ratnagiri District, Maharashtra.

Methods: Over the past four years (2022–2025), regular field trips have been conducted on the lateritic plateaus of the Ratnagiri district to survey, collect, and document plant species during the monsoon. Photographs of habitat and habitat were taken. The Garmin GPSMAP 64S device was used to record the GPS coordinates. By consulting a variety of flora and literature, the specimens collected was identified.

Results: *Utricularia* lazulina P. Taylor was described from its type locality at South Kanara from Karnataka state. The species is very little known for its distribution from the state of Maharashtra. It was reported for the first time from the state of Maharashtra from Vaibhavwadi, Sindhudurg District. In the current study, we have reported this species adding to its distribution from Rajapur Taluka, Ratnagiri District for the state of Maharashtra.

Conclusion: In this study, we reported the occurrence of this species from Rajapur Taluka in Ratnagiri District, Maharashtra, marking it as only the second documented location for its distribution from the state.

Application: The study significantly aligns applications with understanding regional floristic knowledge. It also put forth special emphases on needs to conserve and protect the lateritic plateaus as refuges for endemic plant life.

Keywords: Additions/ new record, Endemic, Lentibulariaceae, *Utricularia*, Ratnagiri (Konkan).

Poster Abstracts
by
Young Investigator

Biochemical drivers of Flavour in Prawns and Shrimps

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ABSTRACT

Introduction: Free amino acids have been identified as the key non-volatile taste-active compounds in prawns and shrimps, directly contributing to umami, sweetness, and bitterness through specific interactions with taste receptors. They are derived from proteolysis, metabolic activity, and post-harvest biochemical changes; their concentrations vary widely across species and environments. Despite being at the core of flavor profiles in crustaceans, well-rounded syntheses that bring together biochemical profiles, environmental modulation, and analytical flavor indices are few in the literature.

Objectives: This review consolidates the current scientific understanding of how FAA composition determines flavour characteristics in commercially important prawn and shrimp species; it further evaluates analytical and sensory metrics capable of supporting standardized, flavour-based quality grading.

Methods: A search for literature from Web of Science, Google Scholar, and ResearchGate was conducted by targeted terms regarding FAAs, taste chemistry, umami compounds, and crustacean flavour. Studies that focused on the quantification of FAAs by HPLC and GC-MS and presented flavour indices like EUC and TAV were emphasized.

Results: Glutamic and aspartic acids were commonly observed as major umami-enhancing amino acids, while sweetness was contributed by glycine, alanine, and serine. The hydrophobic amino acids such as arginine and leucine were related to bitterness when present at high TAVs. FAA profiles heavily depended on salinity, temperature, pH, diet, season, and culture system, with further changes due to fermentation, thermal processing, and storage.

Conclusion: Specific FAA signatures correlate robustly with sensory outcomes and are systematically shaped by environmental and processing factors.

Applications: This biochemical framework informs standardized grading protocols, underpins flavour-oriented aquaculture and processing optimization, and enhances product differentiation and certification in global seafood markets.

Key words: Shrimps, Free amino acids, umami taste, quality assessment

Poster Abstracts
by
Research Scholars

A comparative quality control study on regional castor seeds and different brands of cold-press castor oil

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ABSTRACT

Introduction: India is the largest producer of castor (*Ricinus communis L*). According to the reports from 2023-2024, India's total castor seed production was estimated at 18.79 lakh tonnes. Castor oil and its derivatives have diverse industrial applications, spanning pharmaceuticals, chemicals, cosmetics, plastics, lubricants, food, rubber, paints, soaps and fuel sectors. 80% of the produced castor oil is exported. A steady decline in castor oil exports has been reported. A few of the factors that hamper the quality of castor oil are seed variety, growing conditions and post-harvest handling.

Objectives: To evaluate the quality of castor seeds using moisture studies, ash studies and extractive studies. To evaluate the quality of cold-press castor oil using acid value and saponification value.

Methods: Quality control studies involving proximate analysis were performed on castor seeds and oil referring to the Ayurvedic Pharmacopeia (API) and the Indian Pharmacopeia (IP) respectively. Castor seeds were collected from market available, Mumbai, Pune, Nashik, Bangalore, Goa and Madhya Pradesh. Cold-press castor oil was collected from brands such as Ashwin chemicals, Yugandhar, Aarogya, Agribi, Sips and Bites.

Results: Data analysis for statistical significance is in progress, and the findings will be shared shortly.

Conclusion: On basis of the parameter mentioned in the API, market-available seeds and those from Madhya Pradesh indicated significantly better quality than the other regional seeds. Similarly, all the marketed castor oil brands indicated good quality cold-press castor oil, each fulfilling the estimated limits from IP. Therefore, both castor seeds and castor oil meet the required pharmacopeial criteria and can be regarded as standardized crude drug.

Application: The castor seeds and castor oil which are now standardized a can now be used as the crude drug for subsequent phytochemical profiling and pharmacological investigations.

Keywords: Castor seeds, cold-press castor oil, quality control.

Bioactivity assessment of scorpion venom: SDS-PAGE characterization and anti-angiogenic evaluation using the chick chorioallantoic membrane (CAM) Assay

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ABSTRACT

Introduction: Scorpion venom is a complex mixture of bioactive molecules with diverse pharmacological activities. Recent interest has focused on its potential anti-angiogenic effects, which may contribute to the development of novel therapeutics for cancer and other angiogenesis-dependent diseases.

Objectives: This study aimed to protein profile through SDS-PAGE, and evaluate its anti-angiogenic potential using the chick chorioallantoic membrane (CAM) assay.

Methods: Adult scorpions were collected and subjected to electrical stimulation to obtain crude venom (SV), which was immediately stored at −20 °C. Protein composition was analyzed using SDS-PAGE (Polyacrylamide Gel Electrophoresis), employing a 12 % polyacrylamide gel to resolve low-molecular-weight peptides. The anti-angiogenic activity was assessed by chick chorioallantoic membrane assay using 5 days incubated hen eggs and angiogenic responses were evaluated by morphometric investigations.

Results: SDS-PAGE analysis revealed multiple protein bands ranging from ~25 to 85 kDa. In the CAM assay, venom-treated membranes showed a dose-dependent reduction in number of first order blood vessels and number of branching points.

Conclusion: The SV exhibited a heterogeneous protein profile and demonstrated anti-angiogenic activity in the CAM model. These findings support the presence of bioactive molecules capable of modulating vascular development.

Application: The demonstrated anti-angiogenic activity of scorpion venom highlights its potential as a valuable source for developing novel anticancer agents and vascular-targeted therapeutics.

Keywords: Bioactivity, Scorpion Venom, SDS PAGE, anti-angiogenic, CAM Assay

Bridging chemistry and machine learning: predicting enantioselectivity in Copper-Catalyzed Arylation for data-driven catalyst design

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ABSTRACT

Introduction: Synthesis of chiral molecules with complex structures useful for pharmaceutical applications can be achieved by enantioselective catalysis. However, predicting enantioselectivity with high accuracy remains a challenge due to the complex mechanism and interplay of electronic and steric and factors influencing catalytic reactions. Machine Learning provides data-driven approach to predict the enantiomeric excess in chiral catalysis reactions.

Objective: The aim of the present work is to develop ML models to predict the enantioselectivity or %ee of the copper-catalyzed arylation of alkenes using aryl boronic acids and chiral oxazoline ligands, thereby aiding in the rational design of catalysts.

Methods: The reaction system was represented using 170 molecular descriptors (local and global parameters) capturing steric, electronic, and topological characteristics. Various regression algorithms—Support Vector Regression (SVR), Random Forest (RF), Gradient Boosting (GB), and Extreme Gradient Boosting (XGB)—were applied to model enantioselectivity. Model performance was evaluated based on standard statistical metrics such as R^2, RMSE, and MAE.

Results: Among the tested models, ensemble-based methods (RF and XGB) exhibited superior predictive accuracy and robustness compared to linear and kernel-based approaches. The best-performing model exhibited robust correlation between experimental and predicted enantioselectivities. Our results suggest that the chosen descriptors accurately reflects the reaction's stereochemical complexities.

Conclusion: The ML models successfully predict enantioselectivity with high accuracy, providing valuable mechanistic insights.

Application: Field of machine learning can accelerate catalyst design and reaction optimization to reduce experimentation and thereby enable data-guided discovery of highly enantioselective reactions in asymmetric catalysis.

Keywords: Computational Chemistry, Data – Driven Catalysis, Reaction Optimization, Enantioselective Prediction, Asymmetric Catalysis.

Eco-Taxonomy of *Ricinus communis* L.

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ABSTRACT

Introduction: Eco-taxonomy examines how ecological factors modify plant characteristics relevant to taxonomy. *Ricinus communis L.*, from the Euphorbiaceae family, occurs in varied habitats. This study evaluates ecological influences on its morphology and physiology across SGNP, beach, and mangrove regions.

Objectives: To compare morphological and stomatal characteristics of *R. communis* across three ecotypes. To assess proline and chlorophyll variation as indicators of environmental stress. To evaluate whether ecological differences affect taxonomic identity.

Methods: Morphological traits were documented through field observation. The stomatal index was calculated using epidermal peels. Proline content was estimated using the ninhydrin method (520 nm), and chlorophyll levels were quantified using 80% acetone extraction with spectrophotometric readings at 645, 652, and 663 nm. Statistical analysis was performed using mean ± SD and t-test.

Results: Stomatal index showed minimal variation (18.05–18.09), confirming species uniformity. Proline was highest in mangrove (stress conditions) and lowest in SGNP (control). Chlorophyll content was greatest in SGNP and lowest at the beach, indicating reduced photosynthetic potential under stress.

Conclusion: Environmental conditions influence biochemical parameters of *R. communis* without affecting its taxonomic identity. Proline increases under stress, while chlorophyll decreases, demonstrating habitat-induced physiological variability.

Application: Eco-taxonomic analysis can support species identification, monitor environmental stress, and guide habitat-based conservation and phytoremediation programs involving *R. communis.*

Keywords: eco-taxonomy, *Ricinus communis*, ecotypes, stomatal index, proline, chlorophyll, environmental stress, habitat variation.

Exploring the Senotherapeutic Potential of Panobinostat in Chemotherapy-Induced Senescence

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ABSTRACT

Introduction: Cancer is the second leading cause of death worldwide, with breast cancer being the most diagnosed among women. Despite therapeutic advances, survival remains low due to metastasis and recurrence. Therapy-induced senescence (TIS) after prolonged chemotherapy causes cells to enter dormancy and later re-enter the cell cycle, driving aggressive cancer recurrence. Senescent cells exhibit a secretory phenotype (SASP) that releases cytokines, chemokines, and growth factors. Epigenetic changes, including histone hypoacetylation (H3 and H4), repress genes controlling proliferation and apoptosis, promoting cell cycle arrest. Panobinostat, an FDA-approved pan-HDAC inhibitor, targets such epigenetic modulations in haematological cancers but has limited use against solid cancers. As it inhibits HDAC activity, it can be a potential senotherapeutic compound due to the increased HDAC activity in senescent cells.

Objectives: The study aims to investigate the senotherapeutic potential of Panobinostat in Doxorubicin induced senescent breast cancer cells.

Methods: Breast cancer cells were treated with doxorubicin to induce senescence. The effect of Panobinostat was explored against senescent breast cancer cells by assessing the expression of senescent markers p21, BCL-XL, BAX and SASP markers IL-6 & IL-8 at mRNA levels. The expression of the senescent markers was studied at the protein level by Western Blot studies.

Results: The preliminary results indicate Panobinostat shows cytotoxicity towards senescent breast cancer cells. Low doses of Panobinostat show decrease in the expression of senescent markers at mRNA level.

Conclusion: Panobinostat could potentially be a senotherapeutic compound against senescent breast cancer cells.

Application: Panobinostat is a pan-HDAC inhibitor and can be studied further as a potential epidrug in breast cancer treatment and senescence. This can help improve the patient outcome by impairing recurrence of cancer and tumour progression.

Keywords: Breast Cancer, Senescence, Senotherapy, Epidrugs, Histone acetylation.

Identification of Differentially Expressed Genes Driving HER-2+ Breast Cancer Progression

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ABSTRACT

Introduction: Breast cancer is among the most prevalent malignancies and the second leading cause of cancer related mortality. Around 25% cases are classified as HER-2+, associated with an aggressive tumour behaviour and poor prognosis. Understanding the molecular alterations between the HER2+ Breast cancer and normal breast tissues can help identify potential biomarkers for diagnosis, prognosis and targeted therapy.

Objectives: To analyse differentially expressed genes between HER-2+ Breast cancer dataset and perform functional enrichment analysis to elucidate pathways involved in early disease prognosis.

Methods: Gene Expression datasets were retrieved from GEO database. Differentially expressed genes (DEGs) were identified with GEO2R. Gene enrichment analysis was conducted to determine the biological and functional roles. PPI networks were constructed and hub genes were identified using Cytoscape. Expression patterns of these hub genes in normal breast tissue were validated. Survival analysis was performed to evaluate the prognostic significance of the hub genes.

Results: Analysis showed1800 upregulated and 800 downregulated DEGs in HER-2+ Breast Cancer compared with the normal tissue. Enrichment analysis revealed pathways critical for HER-2+ breast cancer prognosis. Hub gene screening highlighted genes with significant dysregulation and distinct expression trends. Survival analysis demonstrated that altered expression of selected hub genes correlated with poor patient outcomes.

Conclusions: The analysis identifies key dysregulated genes and pathways in HER-2+ breast cancer, with hub gene expression significantly associated with patient prognosis.

Applications: Hub genes may serve as candidate biomarkers for early detection and promising targets for therapeutic intervention in HER-2+ Breast cancers.

Keywords: DEG, HER-2+ Breast Cancer, Enrichment Analysis, Biomarkers.

Immunoprotective efficacy of nanoencapsulated OMPs in *Labeo rohita* against *F. columnare*

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ABSTRACT

Introduction: Disease outbreaks in fish farms, caused by Gram-negative organism *Flavobacterium columnare*, leads to severe economic losses for the aquaculture industry. To mitigate such economic losses and curb the spread of antibiotic resistance in fish, nano-vaccines offers a promising strategy for efficient targeted delivery.

Objectives: To evaluate the protective efficacy of nanoencapsulated outer membrane proteins (OMP-CSNPs) by measuring the relative percentage survival (RPS) and specific antibody production in the fish.

Methods: Outer membrane proteins (OMPs) were extracted from *F. columnare* and encapsulated in chitosan nanoparticles (CSNPs). Rohu (*Labeo rohita*) (± 22.5g) were immunised intraperitoneally with OMP, OMP-CSNPs, CSNPs, and PBS. On the 35th day of post-immunisation, all groups including the control were challenged with *F. columnare*. The resulting specific immune response against OMP-CSNPs was subsequently analysed using the indirect enzyme-linked immunosorbent assay (ELISA).

Results: The highest RPS was observed in the OMP-CSNPs group at 74.33 ± 4.04%, followed by the OMPs group at 63.33 ± 3.5%, and the CSNPs group at 48.66 ± 8.08%. The cutoff of the ELISA for the detection of *F. columnare* was drawn by Classen's method, which was 0.198 ± 0.03 OD. Based on it, the antibody levels measured post-vaccination were highest in the OMP-CSNPs group, demonstrating a statistically significant ($p = 0.0005$) over the OMP group. Conversely, no antibodies were detected in the fish treated with either the CSNPs or the PBS.

Conclusion: The study confirms that OMPs extracted from *F. columnare*, especially when delivered via CSNPs, are potent inducers of specific

immunity in the fish.

Application: Encapsulated outer membrane protein (OMP-CSNPs) may be considered as an ideal vaccine candidate in fish against columnaris disease.

Keywords: *Labeo rohita*, columnaris, encapsulated outer membrane proteins, relative percent survival, specific immunity.

Network Pharmacology based exploration of the multitarget mechanisms of Avipattikar Churna in IBD and Associated Diarrhea

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ABSTRACT

Introduction: Avipattikar Churna is a traditional Ayurvedic formulation used for Inflammatory Bowel Disease (IBD) and diarrhea. It contains Amla, Haritaki, Pippali, Sunthi, Maricha, and Musta, known for gastrointestinal and anti-inflammatory actions. Although widely used, its molecular mechanism remains unclear. This study uses Network Pharmacology to understand how its phytoconstituents act on disease-related targets. Around 400 phytochemicals were identified and linked to nearly 700 human genes. For IBD and diarrhea, 9366 disease-associated genes were collected, and 80 overlapping targets were found. Network construction using STRING, Cytoscape and Venny 2.1.0 showed involvement in inflammation control, microbial suppression, tissue repair, and mucosal protection. These findings indicate a multi-component, multi-target mechanism supporting the traditional therapeutic use of Avipattikar Churna.

Objectives: To map interactions between Avipattikar Churna phytoconstituents and IBD-related genes. To identify mechanistic pathways involved in its therapeutic activity.

Methods: Identification of ~ 400 phytochemicals. Mapping of compounds to ~ 700 gene targets. Collection of 9366 IBD-related genes. Identification of 80 overlapping targets. Network construction using STRING, Cytoscape, and Venny 2.1.0. Pathway-level interpretation.

Results: The shared targets were mainly linked to inflammation control, bacterial suppression, and tissue repair.

Conclusion: Avipattikar Churna acts through multiple phytoconstituents that collectively modulate pathways relevant to IBD and diarrhea, supporting its traditional therapeutic role.

Applications: Supports the traditional use of Avipattikar Churna with scientific evidence. Connects Ayurvedic medicine with modern pharmacology. Helps identify key targets for future research and formulation improvement.

Keywords: Avipattikar Churna, Network Pharmacology, Inflammatory Bowel Disease (IBD), Diarrhea, Phytoconstituents, Herbal Formulation.

Study of Acyl Homoserine Lactone (AHL) degradation activity of microorganism isolated from environmental samples

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ABSTRACT

Introduction: Biofilm formation is the major cause of antibiotic resistance among the bacterial pathogens leading to treatment failure as it enhances the bacterial survival capability. Quorum sensing (QS) plays a very important role in converting microcolonies to mature biofilm, which is why QS inhibitors can potentially stop the transition to this stage where bacteria are more tolerant. AHL (Acyl homoserine lactone) is quorum sensing signal molecule, responsible for biofilm formation in Gram-negative bacteria. In recent past the research focus is on the use of AHL degrading enzymes, as an attractive strategy to inhibit biofilm formation and limit the pathogenicity of bacteria.

Objectives: The aim of this study was to isolate acyl homoserine lactone (AHL) degrading microorganism from different environmental sample. Isolated microbial strains were screened to check the AHL degradation ability. Crude enzyme extract of screened isolates was studied to select efficient AHL degrading isolate for further study.

Methods: Environmental samples soil, water and sediment (n=14) were collected from three diverse environmental conditions such as Vajreshwari hot springs, Salt pan in Vasai, rhizospheric soil around Mangrove plants in Khar, Mumbai. Microbial strains were enriched and isolated by using Nutrient agar medium and Zobell marine agar medium and incubating at different cultute condition.AHL degrading ability of each isolated bacterium was evaluated by using *Chromobacterium violaceum* CV026 biosensor strain by agar overlay assay method (qualitative) and violacein pigmentation assay (quantitative) with synthetic AHL C6HSL. The activity of intracellular and extracellular supernatant as crude enzyme extract was studied using 50 µM of C6HSL. Genomic DNA from the selected bacterial isolate was used for amplification of the 16S rRNA gene using universal primer 27F and 1492R. PCR products were sent for the sequencing. The sequence was subjected to database matching in NCBI BlastN.

Results: Total 80 isolates were yielded which are either alone or as part of a consortium. Total 34 isolates have C6HSL degrading activity. After qualitative and quantitative screening, the isolates AK4, CSS-1, BMS - 4, M-III-3, M17 showed efficient degradation activity for 50 µM of C6HSL within 2 h. It was found that extracellular enzyme extract of AK4 showed more than 50% and CSS 1 showed more than 45 % of 50 µM C6HSL degradation. The 16S ribosomal deoxyribonucleic acid analysis revealed the isolated bacteria AK4 as *Bacillus cereus* and CSS1 as *Bacillus tropicus.*

Conclusion: Among 80 microbial strains isolated from different environments, 5 isolates AK4, BMS 4, CSS1, M3-3 and M17 showed good degradation ability of the C6HSL molecule. AKA and CSS1 produced extracellular enzyme able to degrade 50 µM C6HSL more than 50 % and 48 % within 2h respectively. AK4 isolate was selected as efficient AHL degrading bacteria. 16S rRNA analysis revealed the isolated bacteria AK4 as Bacillus cereus and CSS 1 as *Bacillus tropicus*.

Application: Further purification and characterization of extracellular enzyme will increase quorum quenching ability which will provide an efficient enzyme can be used as potential strategy for attenuating quorum sensing regulated bacterial infections.

Keywords: Biofilm, Quorum sensing, Antibiotic resistance, AHL degrading enzyme, quorum quenching.

Poster Abstracts by Postgraduate and Undergraduate Learners

A Safe Botanical Shield: Standardization and Anti-Weevil Efficacy Study of a Novel Fortified Coconut Oil

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ABSTRACT

Introduction: The high dependence on synthetic pesticides for the control of storage pests like the rice weevil, Sitophilus oryzae, creates serious environmental and consumer health risks. The critical demand for safe, natural alternatives led to the selection of *Cyperus rotundus* and *Phyllanthus amarus*, two plants from India whose traditional insecticidal properties have been well-established. For the two potent botanicals to be commercialized, quality control and standardization were mandatory to ensure reproducibility in efficacy with market viability.

Objectives: The present study deals with the formulation of a new, botanically enriched coconut oil that could act as an efficient, natural, and harmless substitute for dangerous synthetic chemicals like permethrins, pyrethrins, and boric acid. The formulation has been done in a manner aimed at commercial product development exploiting the established properties of *Cyperus rotundus* and *Phyllanthus amarus*. Establishment of detailed QC parameters for both the raw ingredients and the final oil formulation was a key requirement for commercial adoption and regulatory approval.

Methods: Raw material QC included physicochemical and preliminary phytochemical evaluation of the powdered plant materials. After standardization, the powders were added to coconut oil using standard Ayurvedic procedures. The final quality of the oil was carefully assessed by relevant oil-specific QC assays for setting critical quality parameters. Anti-weevil efficacy was finally determined by contact toxicity studies conducted against rice weevils, *Sitophilus oryzae.*

Results: The initial QC studies confirmed the purity and adherence to standards for both raw plant powders and the resulting fortified oil, thus successfully establishing quality parameters for the novel formulation. The efficacy testing revealed that the fortified coconut oil had significant anti-weevil properties in contact toxicity assays.

Conclusion: The results supported the efficacy of *Cyperus rotundus* and *Phyllanthus amarus* in synergistically interacting within a coconut oil base to be used as a safe, effective natural pesticide.

Applications: The complete QC data along with established bio-efficacy formed the required basis for the product design, patent application, and subsequent commercialization. Further studies were called for regarding long-term storage stability, large-scale field efficacy testing, and comprehensive toxicological profiling against non-target organisms.

Keywords: Fortified Coconut Oil, Anti-weevil, Contact Toxicity, Quality Control

Assessing the bioactivity induced by plant derived compounds on *Caenorhabditis elegans* - a review

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ABSTRACT

Introduction: *Caenorhabditis elegans* is a microscopic nematode widely used as a model organism due to irs small size, (1mm) with transparent body and short life span (approximately 3days). Plant derived compounds are naturally produced secondary metabolites that help the plants to defend against environmental threats. They are not involved in basic growth and reproduction but however contribute in a significant way for plant survival.

Objectives: To review the Bioactivity induced by Plant derived metabolites on *C. elegans.*

Methods: An extensive literature review was performed ustilizing academic bases like ScienceDirect, FrontiersIn, ACS Publications, National Library of Medicine, ProQuest. The study is focused on *Caenorhabditis elegans* and the impacts of the plant based extracts and isolated metabolites such as flavonoids, polyphenols.

Results: Research indicates that many plant extracts and metabolites, including polyphenols and flavonoids, mitigate oxidative stress, extend life and health span by modulating redox balance and metabolic markers. Studies reveal that plant-derived antimicrobial agents reduce pathogen virulence and improve the survival of *Caenorhabditis elegans.*

Conclusion: *Caenorhabditis elegans* serves as rapid and inexpensive in vivo model to screen plant-derived materials for bioactivity (anti-oxidant,antimicrobial, lifespan effects) or toxicity. Validating it as a model for discovering new, less harmful antibacterial and antifungal drugs compared to synthetics.

Application: Such research helps to understand the gravity of the toxicological effects of the toxins tested upon the organism. It can lead to discovery of plant-based medicine or in developing plant based therapies for aging and oxidative stress.

Keywords: *Caenorhabditis elegans,* Plant Derived Compounds, Plant metabolites, Toxicological Assesement.

Computational Analysis of pH-Dependent Hyaluronic Acid-CD44 Interactions Using Molecular Docking and Protonation State Modelling

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ABSTRACT

Introduction: Hyaluronic acid (HA) is the main biopolymer responsible for skin hydration and repair, and it performs its activity primarily by interacting with the cell surface receptor CD44. Variations in skin pH may alter protein-ligand interactions by altering the differential protonation of key amino acid residues. Understanding these pH-dependent changes in structure and electrostatics is crucial to the rational design of biomimetic and dermatological formulations.

Objectives: To computationally investigate the effect of environmental pH on the binding affinity between CD44 and hyaluronic acid using molecular docking, and to establish a reproducible bioinformatics pipeline incorporating protonation-state modelling.

Methods: The docked HA–CD44 complex was subjected to pH-based protonation state assignment, with the PROPKA algorithm run via the PDB2PQR server so as to produce models that approximate the ionisation pattern at specific pH levels. AutoDock Vina was then used to conduct docking simulations with both wild-type and protonated receptor structures. The binding energies from those results are compared, and inhibition constants calculated to quantify the effect of pH on affinity.

Results: Preliminary docking calculations showed a moderate variation in the binding free energy between native and protonated forms, suggesting that the protonation of key residues located close to the HA-binding groove may affect stability and interaction strength.

Conclusion: These findings emphasise the importance of including environmental pH as a factor in the computational modelling of receptor-

ligand systems and highlight a feasible workflow for future pH-sensitive simulations.

Application: This study lays the foundation for targeted, pH-responsive, and personalised dermatological formulations that exploit the interactions of CD44 with HA.

Keywords: Hyaluronic acid, CD44, molecular docking, protonation, pH modelling, PROPKA, AutoDock Vina.

Dysbiosis and maternal microbiome transmission in early life: exploring gut brain communication and autism spectrum disorder risk

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ABSTRACT

Introduction: The community of microbes in the human gut is important for managing immunity, metabolic stability, and brain development through the gut-brain axis. Current research indicates that a newborn's gut microbiota starts to form before birth and is heavily affected by the mother's microbial environment.

Objective: This review aims to examine how microbes pass from mother to child, study microbial changes linked to Autism Spectrum Disorder (ASD), and consider if microbiome-related tools can help diagnose and treat the condition early.

Methods: Recent literature from the past five years has been reviewed and categorized to examine how maternal health factors like diet, antibiotic use, delivery method, and breastfeeding affect the newborn's microbiota. The review focuses on key areas like the gut microbiome, how the maternal microbiome is passed on, Autism Spectrum Disorder (ASD), Dysbiosis, and the Gut-brain axis to give a full view of how microbes play a role in early neurodevelopment and disease.

Results: Research indicates that the maternal vaginal and breast milk microbiota serve as important sources of initial colonization in infants. Differences in the types of gut bacteria present early in life have been linked to changes in immune system signals and brain inflammation, which are linked to autism spectrum disorder (ASD). Children with ASD typically exhibit reduced microbial diversity and decreased production of short-chain fatty acids, suggesting a disruption in gut-brain communication.

Conclusion: It can be stated that since the gut microbiota develops in foetal and early postnatal life, it can be a valuable biomarker for early diagnosis of ASD. Non-invasive microbial profiling may allow identification of dysbiosis

patterns and facilitate microbe-specific interventions to restore microbial balance.

Application: The practical application of these findings lies in designing early, targeted strategies that promote healthy neurodevelopment and alleviate ASD-associated symptoms. This review highlights upon the maternal microbial transmission, microbial changes related to ASD, and the translational prospects of microbiome-based diagnostics and therapeutics in management of ASD.

Keywords: Gut microbiome, Maternal microbiome transmission, Autism Spectrum Disorder (ASD), Dysbiosis, Gut-brain axis.

Eco-Eating: The Rise of Sustainable Cutlery

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ABSTRACT

Introduction: Plastic cutlery is widely used due to its convenience, low cost, and durability, but its nonbiodegradable nature has contributed significantly to global plastic pollution. With plastic cutlery identified as one of the major contributors to microplastic accumulation, the development of safe, sustainable alternatives has become essential. This study focuses on formulating edible cutlery using wheat, rice, jowar, and bajra flours as an eco-friendly replacement for single-use plastic utensils.

Objectives: To formulate edible cutlery using selected cereal flours. To prepare variants and evaluate their physical and nutritional properties. To assess biodegradability and consumer acceptability through surveys.

Methods: Edible spoons, plates, and bowls were prepared by mixing flour with water and oil, shaping the dough, and baking it. Nutritional analyses included total carbohydrate estimation (Anthrone method), phosphorus estimation (Fiske–Subbarow method), and magnesium estimation (EDTA titration). Physical evaluations included moisture content, disintegration ability, and water absorption capacity. Biodegradability was assessed in sterile soil, and an organoleptic survey evaluated public awareness and acceptance.

Results: The prepared cutlery showed high carbohydrate content (1860 ± 59.9 mg%), phosphorus (4.2 ± 0.11 mg%), and magnesium (2.4 ± 0.04 mg%). Moisture content was 4.5%. The cutlery retained integrity in liquid for over 2 hours. Water absorption capacities were 40% (bowl) and 57.44% (plate). Soil degradation of the spoon occurred within 20 days. Survey responses indicated high awareness and positive acceptance of edible cutlery as a sustainable alternative.

Conclusion: The developed edible cutlery exhibited good physical stability, nutritional value, biodegradability, and consumer acceptance.

Application: Edible cutlery can significantly reduce plastic waste and provide a practical, eco-friendly alternative for food service industries.

Keywords: Edible cutlery, durable, sustainable, cereals, biodegradable.

Exploring the Anti-fungal properties of digestive enzymes of Nile tilapia (*Oreochromis niloticus*)

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ABSTRACT

Introduction: Nile tilapia (*Oreochromis niloticus*) is a fast-growing marine fish species, resistant to diseases, and easy to handle. It tolerates a wide range of environmental stressors and is processed in industries on a wide scale. This, however, generates a significant amount of waste, specifically the viscera. Fish viscera have been proven to be a good source of digestive enzymes, with proteases being the primary isolate, with amylase being a second. *Aspergillus flavus* is one of the primary culprits of food spoilage, producing Aflatoxins (AFs). Aflatoxins are classified as group 1 carcinogens by the International Agency for Research on Cancer.

Objectives: To explore the anti-fungal properties of the enzyme content extracted from the viscera of Nile Tilapia.

Methods: *Aspergillus flavus* was grown on moist bread and cultured on 10% PDA (Potato Dexrose Agar) plates. Viscera of Nile Tilapia was obtained from the local fish market (Andheri). The tissue was treated with Tris-HCl buffer and a clear supernatant of enzymatic content was obtained. The supernatant was exposed to the *flavus* plates and growth of the fungus was observed.

Results: There was a reduction in the size of the acquired growth of flavus. Upon observation of the plate under a light microscope, disruptions and irregularities in the fungal hypae could be seen clearly.

Conclusion: The enzymatic extract from Tilapia viscera demonstrated clear anti-fungal effects against Aspergillus flavus showing reduced colony growth and structural disruption. Application: The enzymes could be utilized to treat food products and increase their shelf life. It could also be used to treat fungal infections and prove to be useful in other aspects of Biomedicine.

Keywords: Nile tilapia, Digestive enzymes, *Aspergillus flavus*, Antifungal activity, Enzymatic inhibition.

From Contigs to Clinical Decisions: A High-Throughput Bioinformatics Pipeline for Automated Antimicrobial Resistance Profiling and Mutation Analysis

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ABSTRACT

Introduction: Antimicrobial Resistance (AMR) is a rapidly escalating global health crisis, projected to cause 10 million deaths annually by 2050. While genomic sequencing has become accessible, the downstream analysis of clinical isolates remains a bottleneck.

Objectives: Current workflows for identifying functional resistance—specifically point mutations that confer high-level drug resistance—are often manual, fragmented, and time-intensive. This project introduces a fully automated, coordinate-driven bioinformatics pipeline designed to accelerate AMR profiling in clinical and environmental sectors.

Methods: The proposed workflow utilizes a proprietary tech stack available via GitHub. The logic follows a "Coordinate-Hand-off" model to maximize speed and accuracy.

Results: The pipeline integrates four custom-developed Python tools: Genome Extractor for rapid data retrieval, ABRicate Automator for high-throughput gene screening, FastaAAExtractor for precision protein extraction, and WildTypeAligner & SubScan for protein comparison and polymorphism detection.

Conclusion: We demonstrate the pipeline's utility by profiling clinically critical targets (e.g., *blaKPC, mecA, gyrA*), providing hospital staff with immediate, actionable data for antibiotic stewardship and infection control.

Application: By eliminating the reliance on complex annotation files (GFF3) and automating the gene-to-protein workflow, this system reduces analysis time from hours to seconds per genome.

Keywords: antimicrobial resistance, bioinformatics pipeline, clinical isolates, Python tools, antibiotic stewardship.

Functional Food Fortification: Antioxidant and Genoprotective Assessment of *Flemingia strobilifera* Leaves as a New Food Fortification Ingredient

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ABSTRACT

Introduction: The leaves of this endemic Indian plant, *Flemingia strobilifera*, have previously been established to possess prominent antihelminthic potential both traditionally and scientifically. Expanding upon these therapeutic findings, the current study sought to determine the broader genoprotective and antioxidant profile of the leaves.

Objective: This research aimed to formally evaluate these protective properties, supported by crucial quality control data, to propose the plant leaves as a novel fortification food rich in protective bioactive compounds suitable for churna or seasoning applications.

Methods: Genoprotective abilities were investigated using the Allium sativum assay, where the plant extracts were tested against the known genotoxicants paradichlorobenzene (PDB) and Mercuric Chloride. Antioxidant potential was quantified using common radical scavenging assays, including DPPH and Galvinoxyl free radical scavenging assay, FRAP assay and SOD assay. Quality control (QC) was achieved through preliminary phytochemical screening and subsequent spectrometric detection of major chemical groups.

Results: The Allium sativum assay successfully demonstrated that the plant leaves were potently genoprotective against the harmful effects of PDB and Mercuric Chloride. Concurrently, the antioxidant studies confirmed a prominent antioxidant potential of the leaves of this plant. The successful QC analysis provided crucial validation for the active phytochemical components.

Conclusion: Collectively, these results, along with the established antihelminthic activity, strongly support the utility of these plant leaves as a safe and functional ingredient for food fortification.

Applications: The processed leaves can be used as a functional food fortifier

(churna/seasoning) to introduce natural antioxidants and genoprotective compounds or formulated into novel dietary supplements for cellular protection. Additionally, the plant material could be developed into a standardized herbal antihelminthic medicine based on its traditional use against parasitic worm infections.

Keywords: Antioxidant, *Flemingia strobilifera*, Genoprotective studies, Functional Food Fortification

Green Chemistry in Action: Cost-Effective Plastic Degradation by *Citrus limetta* Peel Metabolites

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ABSTRACT

Introduction: Plastic waste accumulation has now become a critical environmental crisis. The conventional methods of its disposal, such as incineration, result in toxic emissions. The existing methods of chemical recycling are expensive and hazardous. In this context, the present study comes up with a sustainable and cost-effective solution by valorizing *Citrus limetta* -sweet lime peel oil from discarded fruit skins as a green solvent for plastic degradation.

Objective: Screening of secondary metabolites for Polystyrene (PS) affinity by in silico methods and validation of biodegradation potential along with toxicity of peel oil in vitro.

Materials and Methods: A molecular docking approach was used to predict the binding affinity of certain metabolites (ligands) with the PS chain (macromolecule). Afterwards, the extraction of essential oil solely from sweet lime peels was conducted through Clevenger hydrodistillation. PS was dissolved in the extracted peel oil to test its solubility, and the mixture can be subjected to biodegradability and toxicity analysis. Moreover, the total polyphenol content was determined by means of the Folin-Ciocalteu (FCR) test.

Results: The docking analysis indicated considerable hydrophobic interactions between terpenes/polyphenols and the PS backbone, which promised good solubility. Indeed, the peel-derived oil experimentally achieved rapid dissolution of PS by disrupting the polymer matrix effectively. High phenolic content was confirmed in the FCR test to validate the bioactive profile of this substance.

Conclusion: *Citrus limetta* peel oil is an effective, environmentally friendly biosolvent. These results confirmed that the secondary metabolite of plants has the capability to replace harmful chemicals. Further research is required for

scaling up extraction from fruit wastes at the industrial level and building a 'circular economy' model whereby plastic pollution is directly ameliorated by agricultural waste.

Keywords: Plastic degradation, Molecular docking, *Citrus limetta* peel oil, Clevenger hydrodistillation

Identification and Characterization of antimicrobial compounds in *Ixora javanica* (Blume) DC. leaves methanolic extracts

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ABSTRACT

Introduction: Ethnopharmacological studies on the *ixora* species have revealed substantial amount of antimicrobial activity. This study has been conducted with a goal of providing observable comparison of the phytochemical fingerprint by using techniques of TLC along with the antimicrobial activity of the leaf methanolic extracts from protected environment i.e. Sanjay Gandhi National Park with that from the polluted areas of Charkop and Vile Parle as Environmental stresses like pollution can potentially change the biochemical nature of the wild type to produce certain novel phytochemicals which can be put to human use.

Objectives: Comparative phytochemical fingerprinting studies and antimicrobial studies alongewith isolation and identification of compound responsible for antimicrobial activity in Ixora species from conserved environment (SGNP) and urban set up (Charkop and Vile Parle). The research included toxicity studies on mammalian cells and Molecular docking studies.

Methods: Several assays were used as follows: Bioautography, TLC (Thin layer Chromatography), Antioxidant Assay, Prep TLC, Confirmatory Bioautography, Qualitative Analysis, HR LCMS/MS, Molecular Docking, Toxicity studies.

Results: Bioautography revealed zone of inhibition at Rf value = 0.4 for all samples against *Staphylococcus aureus*. Antimicrobial compounds isolated by preparative-TLC and subjected to HR-LC-MS/MS. The TAC value of the SGNP and Charkop isolates was between 2-20 microg/ml, while the IC_{50} value

by DPPH assay, of SGNP and Charkop isolate was around ~950 microg/ml and >1000 microg/ml, respectively. Common compounds identified by LC-MS/MS in both the samples include Azelaic acid, Ursolic acid, Linoleic acid, DL-Malic acid, Suberic acid etc. Molecular Docking studies of compounds obtained from LC MS/MS against five proteins of *Staphylococcus aureus* (1N67, 1T2P, 2W9T, 2ZCO and 3U2D) and four proteins of Herpes simplex virus (2c36, 2GIY, 2ki5 and 3U82) to identify the binding interactions. Compound that showed the least binding energies with *S. aureus* and HSV proteins was Ursolic acid (-9.2, -10) followed by Betulin (-9, -8.9).

Conclusion: This study presents a variety of antimicrobial compound found in *Ixora Javanica* (Blume) DC leaves that can be potentially used in targeted drug therapy having significantly lesser adverse effects on human health as a beneficial green product.

Applications: Potential antimicrobial compounds, Potential antioxidant compound, Targeted drug therapy.

Keywords: Bioautography, DPPH, TAC, preparative TLC, LC-MS/MS, Molecular docking.

Impact of Parasitism on Phytochemical Profile: Quality Control and HPTLC Assessment of *Cuscuta reflexa* and its Host, *Ziziphus jujuba*

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ABSTRACT

Introduction: *Cuscuta reflexa* is a holoparasitic plant that extensively draws nutrients and secondary metabolites from its host, *Ziziphus jujuba* (Indian Bor). This parasitic relationship complicates quality control (QC) and authentication, as the parasite's chemical profile is heavily influenced by the host, and the host's chemistry is altered by the parasitic burden.

Objective: The current research work addresses the critical issues in the supply chain and pharmacological efficacy of both medicinal plants. The chemical alteration caused by parasitism directly compromises the expected therapeutic efficacy and safety profile of either raw drug when harvested from contaminated sources. Furthermore, the parasitic stress may induce unique host defense mechanisms, potentially leading to the upregulation of novel or enhanced secondary metabolites. The primary aim was thus to establish robust, comparative QC parameters and a definitive High-Performance Thin-Layer Chromatography (HPTLC) fingerprinting method to serve as an indispensable tool for commercial authentication, differentiation, and the initial identification of potentially novel bioproducts.

Methodology: Three distinct powder samples, *Cuscuta reflexa* whole plant, infected *Ziziphus jujuba* leaves, and non-infected *Ziziphus jujuba* leaves, were subjected to comparative QC evaluation. This included assessing physicochemical parameters, preliminary phytochemical screening, evaluation of the content of major phytochemical groups, reducing sugar values, total chlorophyll content, and protein content estimation. Finally, a validated HPTLC fingerprint method was developed and applied to all three samples to establish their unique chemometric profiles.

Applications: This research primarily provides a definitive quality control (QC) and authentication tool for the herbal industry, leveraging a validated

High-Performance Thin-Layer Chromatography (HPTLC) fingerprinting method. This method is crucial for differentiating the parasite (*Cuscuta reflexa*), the infected host (*Ziziphus jujuba*), and the non-infected host, thus ensuring the integrity of the supply chain. By establishing comparative QC parameters, the study directly addresses issues where chemical alterations from parasitism could compromise the therapeutic efficacy and safety profile of the raw drugs. Furthermore, the findings allow for the initial identification of potentially novel bioproducts that may be upregulated in the host due to parasitic stress. In essence, the established HPTLC method serves as a clear, measurable tool to identify phytochemical shifts and assure quality in medicinal plant sourcing.

Results: Significant quantitative differences were observed across all three samples in parameters such as protein content and total chlorophyll, demonstrating the substantial metabolic drain on the infected host. Crucially, the developed HPTLC method successfully established distinct and reproducible fingerprint patterns for *Cuscuta reflexa*, the infected host, and the non-infected host.

Conclusions: This chemometric separation confirmed the unique chemical identity of the parasite and provided a clear, measurable tool to identify phytochemical shifts in *Ziziphus jujuba* due to the parasitic influence. The established HPTLC method serves as a definitive tool for authentication and quality assurance in the herbal industry.

Keywords: *Cuscuta reflexa*, *Ziziphus jujuba*, HPTLC Fingerprinting, Quality Control, Parasitism

Inducer and Rice Bran Optimized B. subtilis Serine Protease for Gluten Hydrolysis

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ABSTRACT

Introduction: Bacillus subtilis serine proteases are valued for their high secretion and GRAS status and can be sustainably enhanced using economical inducers and agro-industrial byproducts like rice bran. Optimising protease production for high activity provides a promising and sustainable solution for gluten hydrolysis, addressing the growing demand for gluten free products.

Objectives: This study investigated the effect of diverse inducers ($CaCl_2$, $MgSO_4$, NaCl and KCl); inhibitor (EDTA) and agro-waste like rice bran as substrate for protease production and its subsequent proteolytic activity for gluten hydrolysis.

Methods: Protease activity was monitored for 72h in defined media supplemented with inducers, inhibitor (1–20mM), rice bran (RB) (10%) and rice bran supplemented with (1%) glucose (RB+G). Activity was quantified using Folin–Ciocalteau and casein plate assays. SDSPAGE, zymography, and temperature profiling were used for enzyme characterization. Gluten hydrolysis was assessed by Ninhydrin and Sorenson's titration methods.

Results: Time dependent analysis over 72 h showed highest protease activity with 1mM KCl (95.9 U/mL; ~1.5-fold increase), whereas 10mM EDTA significantly inhibited enzyme production. Rice bran supplementation with glucose markedly enhanced protease activity from 87.19 to 145.10 U/mL by 72 h (~1.7-fold). Enzyme characterization demonstrated a thermostable 48kDa subtilisin like serine protease exhibiting optimal activity at 75C. The produced enzyme showed 74.18% gluten hydrolysis, confirming its strong hydrolytic potential.

Conclusion: These results highlight the potential of bacterial protease as a biocatalyst for sustainable gluten hydrolysis and positions it as a promising candidate in formulation of gluten-reduced and gluten- free products in food biotechnology.

Application: The extracted protease can be integrated into food processing industries for efficient gluten breakdown and holds potential in fields like industrial biocatalysis, clinical nutrition, brewing and cosmetics.

Keywords: Protease activity, agro waste, gluten hydrolysis, sustainable, subtilisin.

Influence of mid-range sound frequencies (250 Hz–1200 Hz) on the proliferation of *Staphylococcus aureus*

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ABSTRACT

Introduction: Microbes such as *Staphylococcus aureus* thrive in warm, moist environments like the ear canal, where audio devices are frequently used. Acoustic vibrations emitted by speakers in the lowmid frequency range (250–1200 Hz) may influence microbial physiology by altering membrane permeability, disrupting metabolic processes, or modulating gene expression.

Objective: To evaluate the effect of sound frequencies between 250–1200 Hz on the viability of *Staphylococcus aureus.*

Methodology: A suspension of *Staphylococcus aureus* (0.5 McFarland) was exposed to controlled sound frequencies (250–1200 Hz) in a sound box for 1–3 hours. Trials were conducted at two proximities: 10 cm and extremely close to the speaker. Post-exposure, viable counts were determined using standard plate count methods.

Results: Minimal inhibition occurred at 10 cm, indicating insufficient acoustic intensity. When cultures were placed close to the speaker, viability decreased progressively with increasing frequency and exposure time. The most significant inhibition occurred at 1200 Hz, indicating that higher frequencies exert a stronger suppressive effect on *S. aureus* growth.

Conclusion: Prolonged exposure to higher acoustic frequencies may reduce microbial viability, suggesting sustained acoustic energy may influence microbial persistence and potentially alter the ear microbiome over time.

Keywords: *Staphylococcus aureus*, acoustic frequency, microbial viability, ear microbiome.

Insights into the Zoonotic Potential of Bat Coronavirus HKU5 using Phylogenetics and Molecular Docking

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ABSTRACT

Introduction: Bat-origin coronaviruses continue to pose a significant zoonotic threat, as evidenced by SARS and COVID-19. The recently identified bat coronavirus HKU5 is reported to utilize ACE2 receptors in its natural host, suggesting a potential to interact with human ACE2.

Objectives: This study aimed to evaluate the zoonotic potential of HKU5 by analyzing its evolutionary relationship with human coronaviruses and assessing the predicted binding affinity of its spike protein receptor-binding domain (RBD) with human ACE2 through computational approaches.

Methods: Phylogenetic analysis revealed that HKU5 clusters closely with MERS-CoV. Comparative sequence and structural analyses identified the RBD region, which was modelled and validated for structural integrity. Molecular docking simulations indicated that the HKU5 RBD forms a weaker and less stable complex with human ACE2 compared to SARS-CoV, SARS-CoV-2, and MERS-CoV. Binding affinity predictions and interaction profiling showed higher dissociation constants and fewer key contacts in the ACE2–HKU5 complex, suggesting reduced potential for human infection.

Results: Overall, our findings indicate that while HKU5 currently exhibits limited ability to infect humans, its evolutionary proximity to other pathogenic coronaviruses underscores the importance of ongoing monitoring.

Conclusion: This study highlights the utility of in-silico analyses as rapid, cost-effective tools for assessing the zoonotic risk of emerging coronaviruses.

Applications: The study finds its application in supporting proactive surveillance for zoonotic spill-over and preparedness strategies.

Keywords: HKU5, ACE2, RBD domain, binding affinity, zoonotic risks.

Investigation of the Neuroprotective Effects of *Cardiospermum halicacabum* seed extract using *Caenorhabditis elegans* as a model for Alzheimer's Disease

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ABSTRACT

Introduction: Alzheimer's Disease (AD) is a progressive neurodegenerative disorder characterized by amyloid-beta (Aβ) aggregation, oxidative stress, and tau hyperphosphorylation, leading to neuronal loss, cognitive impairment, and dementia. Current drugs treat symptoms without targeting the underlying cause, emphasizing a need for alternative therapeutic strategies.

Objectives: Aimed to investigate the neuroprotective activity of *Cardiospermum halicacabum* seed extract using *Caenorhabditis elegans* as a model for AD (strain: GRU102), which consecutively expresses human Aβ1–42.

Methods: The *C. halicacabum* extract was administered throughout the worm lifespan, and its effect on neuromuscular and behavioural functions of the worms aged till day 8 was evaluated through assays such as, crawling movement, swimming movement, and pharyngeal pumping rate.

Results: The AD worms exhibited a significant decline in motor and feeding activities compared to wild-type (N2), indicating Aβ-induced neuromuscular impairment. However, treatment with *C. halicacabum* extract improved motor coordination and pharyngeal function, suggesting mitigation of oxidative stress and restoration of neuronal function. Statistical analysis using one-way ANOVA and Tukey's post hoc test confirmed significant differences between treated and untreated groups.

Conclusion: The bioactive compounds present in *C. halicacabum* provide neuroprotection by modulating oxidative pathways. This study provides preliminary evidence for the therapeutic potential of *C. halicacabum* against Aβ -induced neurotoxicity and supports its further evaluation as a candidate for plant-based neuroprotective interventions.

Application: This pre-clinical study supports drug-discovery pipelines by laying the groundwork for developing plant-based formulations targeting early amyloid-beta mediated dysfunction.

Keywords: Alzheimer's Disease, Amyloid-beta, *Caenorhabditis elegans, Cardiospermum halicacabum,* neuroprotection.

Migratory Dynamics of Humpback Whales across the Nearctic and Neotropical Realms: A Review

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ABSTRACT

Introduction: Whales are Cetaceans and represent the largest mammals on Earth. Humpback whales are baleen whales characterized by a distinctive humplike structure. These species demonstrate extensive migration patterns throughout all oceans, with major movements observed in the Nearctic and Neotropical regions.

Objectives: To examine the migration routes, behavioural patterns, breeding and resting grounds of humpback whales, with particular focus on identifying feeding and spawning grounds across different latitudinal zones.

Methodology: A comprehensive literature review was conducted using academic databases including ResearchGate, Google Scholar, Academia, ScienceDirect and ProQuest. Studies were analysed focusing on humpback whale populations and their distribution across major coastlines including USA, Nicaragua, and Ecuador in the Pacific, and Dominican Republic and Brazil in the Atlantic. Published research on migration patterns along the tropics toward equatorial regions was reviewed, with emphasis on comparing high latitude feeding grounds with low latitude breeding grounds.

Results: Major movement patterns were identified along tropical routes moving toward the equatorial region at the time of breeding. Significant foraging sites were documented at high latitudes, while breeding grounds were concentrated in low latitude regions.

Conclusion: The primary factor contributing to the decline in whale populations is hunting activities. They are often hunted for Oil, Blubber, Baleen, Meat and Ambergris. Commercial whaling was largely banned by the International Whaling Commission (IWC) moratorium in 1986, though some countries like Japan, Norway, and Iceland have continued limited whaling under various exemptions or by withdrawing from the agreement. Population studies reveal critical conservation needs for this species.

Applications: There is an urgent need for research studies and extensive tagging programs for humpbacks to further study their behavioural patterns, migration routes for feeding, and spawning activities which will be critical for conservation of humpback whales.

Keywords: Humpback Whales, Nearctic, Neotropical, Breeding grounds, Migration

Network Pharmacology Approach to Identifying Potential Targets of *Silybum marianum, Boerhavia diffusa* and *Glycyrrhiza glabra* in Non-Alcoholic Fatty Liver Disease (NAFLD)

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ABSTRACT

Introduction: Non-Alcoholic Fatty Liver Disease (NAFLD) is a rapidly progressing global metabolic disorder characterized by lipid accumulation, liver inflammation and insulin resistance Current therapeutic options are limited increasing interest in phytochemicals with hepatoprotective properties. *Boreavinone B*, *Silymarin and Glycyrrhizin* have shown significant potential, and this study shows how network pharmacology can be applied to identify potential therapeutic targets for NAFLD.

Objectives: To identify phytochemical-target interaction through network pharmacology and molecular docking.

Methods: The phytochemicals *Boreavinone B,Silymarin and Glycyrrhizin* were retrieved from using IMPATT database and evaluated for ADMET properties. Potential gene targets were predicted using various target prediction servers. Meanwhile, NAFLD associated genes were retrieved from disease databases. The functional enrichment analysis of common targets was performed. The common targets of phytochemicals and NAFLD were identified. The protein-protein interaction network was constructed using STRING database and the highly interacting genes identified. The interaction between the phytochemical and the targets was analyzed using Molecular docking.

Results: The selected phytochemicals showed strong drug likeliness and acceptable ADMET properties. The target prediction identified LYPLA1 (Lysophospholipase 1), a key protein of NAFLD as the common target of all the selected phytochemicals by the multiple web-based analysis methods. Docking studies showed binding affinities with LYPLA1. Network analysis identified key hub genes. Enrichment analysis showed pathways related to lipid metabolism and oxidative stress.

Conclusion: Network pharmacology analysis demonstrates the therapeutic potential of these phytochemicals in targeting NAFLD.
Application: This study provides a computational approach to identify targets for future hepatoprotective research.

Keywords: Network pharmacology, NAFLD, Silymarin, Glycyrrhizin, *Boeravinone B.*

Non-Lethal Extraction of Mucin from *Achatina fulica* Using Natural Stimulants

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ABSTRACT

Introduction: *Achatina fulica*, commonly known as the Giant African snail, is a widely distributed terrestrial gastropod and is often used as a model organism due to its adaptability and rapid reproductive capacity. This species thrives in moist, shaded habitats. One of its notable biological features is the mucin it secretes. It is a complex mix of glycoproteins and is rich in beneficial ingredients like hyaluronic acid, collagen, peptides, allantoin and elastin, essential for its locomotion, moisture retention and protection. Despite its biological importance, conventional mucin extraction methods are often harmful or lethal to the organism. Therefore, establishing safe and non-lethal mucin extraction techniques has become an important goal in sustainable gastropod research.

Objectives: To extract substantial amount of mucin from *A. fulica* using natural, non-harmful stimulants. Also to compare the amount of mucin extracted by non-lethal and standard lethal methods. The study also examined the difference in carbohydrate and protein content of the mucin samples.

Methods: *Achatina fulica* were collected from local gardens and acclimatized to conditions similar to their natural habitat. Natural stimulants were applied externally as mild stressors and mucin secretion was observed at time intervals (30, 60 and 120 minutes).

Results: The snails secreted the highest amount of mucin at the 30-minute interval, and the secretion reduced steadily thereafter. The results reviewed that the quantity of mucin derived by lethal and non-lethal methods are similar.

Conclusion: Conventional lethal techniques require grinding whole snails which leads to the organism's death, generating impure mucin contaminated with body tissues. The non-lethal method preserves the specimen, enabling multiple rounds of mucin extraction and producing a cleaner mucin sample with greater cumulative yield. This highlights its ethical and practical advantages.

Applications: Snail mucin is widely known for its use in cosmetic formations due to its hydrating, healing, and skin-regenerative properties. This study demonstrates a non-lethal, ethically viable method for mucin extraction, which can support sustainable mucin-based product development.

Keywords: *Achatina fulica*, Mucin, Non-lethal, Extraction, Natural Stimulants.

Pectin based Bio-coats for Prevention of Metal Corrosion

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ABSTRACT

Introduction: Corrosion is an irreversible electrochemical reaction causing material degradation and significant economic losses worldwide. Conventional protection methods like synthetic coatings, inhibitors, and alloying methods contain hazardous chemicals, causing environmental risks. Green Inhibitors have emerged as a potential alternative. Pectin, a naturally occurring polysaccharide, shows anti-corrosive properties in acidic environments. This study explores the potential of pectin as a green corrosion inhibitor and evaluates its effectiveness in different corrosive environments.

Objectives: The study aims to extract, purify, detect, and characterize pectin; to formulate pectin-based bio-coatings using various additives; and to evaluate the anti-corrosive effectiveness in both water and saline environments. The study also examines the mechanism of interaction of pectin and metals to prevent corrosion at molecular level under varying concentrations, pH and conditions.

Methods: Pectin was extracted by hot acid method and precipitated using ethanol. Detection was done using UV-Vis spec and qualitative tests. Bio-coats were formulated using additives like gelatin, castor oil, sodium benzoate, and potassium sorbate. Evaluation of the performance of the bio-coat was done in various environmental conditions.

Results: Pectin was successfully extracted, precipitated, and detected. The coat formulation of pectin incorporating sodium benzoate, potassium sorbate and glycerol demonstrated the most effective corrosion inhibition in both conditions for a longer duration of time. Coatings containing gelatin and castor oil also produced positive results.

Conclusion: Pectin-based bio-coatings show strong potential as sustainable green corrosion inhibitors. The addition of antimicrobial and plasticizing agents enhances their protective efficiency for a longer duration of time.

Application: To use pectin from different plant sources to study differences in gelling properties and film forming ability. SEM analysis provides better insights into surface changes in coated and uncoated metals. Long-term stability testing under various corrosive conditions onto other metals or alloys can be done for industrial applications.

Keywords: Corrosion, Synthetic coatings, Environmental impact, Bio-coatings, Sustainability

Scientific Validation of Unified Efficacy: Comparative Antioxidant Assessment of Three Classical Ayurvedic Avlehas - Bilvadileha, Drakshavaleha, and Mridvikadileha

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ABSTRACT

Introduction: Ayurvedic Avlehas such as Bilvadileha, Drakshavaleha, and Mridvikadileha, are classical semi-solid preparations traditionally prescribed for diverse conditions, including gastrointestinal complaints, convalescence, and general immunity. However, despite centuries of use, scientific documentation confirming their primary mechanism of action remains scarce.

Objectives: The current research work addresses the need of the hour by investigating the formulations' potential to offer natural dietary support against the high oxidative load of modern lifestyles. The synergistic efficacy potential was investigated as it was hypothesized that the semi-solid Avleha form, with its jaggery/ghee base, may enhance the collective bioavailability of ingredients. The study aimed to confirm their unifying mechanism: combating systemic oxidative stress as being a key factor in chronic diseases.

Methods: The three formulations were prepared under strict quality guidelines as mandated by the Ayurvedic Formulary of India (AFI) and Ayurvedic Pharmacopoeia of India (API). Quality assurance was conducted using established physicochemical limits outlined in their respective monographs, and all formulations were confirmed to abide by these limits. Their comparative antioxidant potential was then evaluated using a panel of established in vitro assays, including DPPH, Galvinoxyl free radical scavenging assay, FRAP assay, and SOD assay.

Results: All three Avlehas successfully met the required QC standards. The comparative antioxidant evaluation demonstrated that all formulations possessed prominent and distinct antioxidant potential.

Conclusion: With this established, future research would focus on advanced in vivo efficacy and bioavailability studies to formally test and substantiate the full spectrum of traditional therapeutic claims.

Applications: These results scientifically validate their traditional use and functional potential, suggesting that the synergistic abilities of these polyherbal compositions is responsible for their efficacy in mitigating inflammation and immune dysfunction.

Keywords: Avlehas, Ayurveda, Antioxidant study, Oxidative Stress

Study of Antimicrobial compounds of *Mammea suriga* (Buch.-Ham. ex Roxb.) Kosterm. Ethnobotanical plant of Western Ghats of India

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ABSTRACT

Introduction: *Mammea suriga* (Buch.-Ham. ex Roxb.) Kosterm. also known as "Surangi" in Marathi, is an endemic, medicinal tree distributed along the Western Ghats of India. *Mammea* s. leaves and stem are abundant in phytochemicals such as coumarins and alkaloids that are known for treatment of dermatological disorders.

Objectives: Use of endemic plants for medicinal purposes by ethnic population suggest the presence of pharmaceutically important bioactive compounds. Endemic plants enhance natural diversity providing avenues for discovery of novel antibiotics. This study aims to analyse the phytochemicals in leaves and stem and explore their pharmaceutical applications.

Methods: Ethanolic stem extracts were prepared and their antibacterial activity was tested by agar well diffusion method. Preparative TLC, Bioautography and HR-LC-MS MS was used to identify potential antimicrobial compounds from the stem extract. MIC of crude and prep extract was performed against Staphylococcus aureus. DPPH assay was performed for antioxidant screening.

Results: Significant inhibition of Gram-positive organisms such as *Staphylococcus aureus, Micrococcus luteus and Bacillus subtilis* was seen by stem extract. Bioautography helped identify presence of antimicrobial compounds at Rf value 4.4 and 5.9. Icaceine and Berbamine were identified as the potential antimicrobial compounds by HR-LC-MS MS. MIC of crude and prep extract was found to be 500ug/ml and 1mg/ml respectively.

Conclusion: The compound is seen to have antimicrobial and antioxidant activity which can be exploited in drug formulation against Gram-positive bacteria.

Application: In-silico studies of the identified compounds for the formulation of an antibiotic drug against conditions such as eczema can be explored further.

Keywords: Surangi, HRLC-MS MS, Preparative TLC, Antioxidant Screening.

Sustainable fish leather from seafood waste: Prototype study

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ABSTRACT

Introduction: Fish skin leather is a sustainable alternative to conventional animal leather as it utilises the waste from the seafood industry. As it is biodegradable and has a low carbon footprint, it aligns itself with the current eco design properties. *Scoliodon skin* is known for its durability, inherent tough texture and thus offers relevant potential for producing flexible and long lasting leather.

Objectives: To produce a biodegradable, eco-friendly, cost-effective leather from fish skin in the laboratory as a sustainable alternative to the conventional animal leather available in the market.

Methods: The fish skin which is regarded as waste was collected from local fish markets of Mumbai, Maharashtra, India. The process involved cleaning the skin, followed by moisture reduction, tanning using natural dyes, and conditioning to soften the leather. Basic manual qualitative tests and mechanical stress tests were conducted on the prototype.

Results: The fish leather prototype created is tough, yet having decent flexibility. The colour absorption is low, however the fragrance holding capacity is present. The leather was able to withstand pressure and exhibited a certain amount of flexibility. The prototype showed promising results in the scrunch test, drape test while displaying some creases in the hand manipulation test.

Conclusion: Fish leather, created from seafood waste, has strong potential as a sustainable material in the textile industry. The fish leather from *Scoliodon* skin does have drawbacks including colour absorption. Further research and experimentation are required in processing and finishing to create a viable product.

Application: Fish leather can be used across the fashion industry, from accessories to eco-friendly textiles

Keywords: Fish leather, *Scoliodon,* fish waste, Sustainable, Flexible

Unmasking PCOS: How Hormones, Lifestyle, and Nutrition Shape Women's Health

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ABSTRACT

Introduction: PCOS is one of the most prevalent endocrine and metabolic conditions, affecting approximately 15–25% of women globally. It is a complex and diverse condition with manifestations in reproduction, metabolism, and psychology. Despite extensive research, the pathophysiology remains poorly understood.

Objectives: To review the causes and risk factors associated with PCOS, including genetic, environmental, and lifestyle contributors. While also analyzing complications such as infertility, metabolic dysfunction, and psychological impacts. Further evaluating current allopathic therapies along with Ayurvedic options and nutraceutical interventions. The review aimed to discuss strategies and highlight gaps in current diagnosis and propose areas for future research.

Methods: A detailed literature review was conducted using academic databases including ResearchGate, Google Scholar, Academia, ScienceDirect and ProQuest. The study focussed on the prevalence, clinical presentation and pathophysiology of PCOS across various populations. Specific attention was given to the possible treatment and diagnostic strategies employed in PCOS.

Results: PCOS is influenced by environmental toxins (BPA, phthalates), genetics, obesity, sedentary lifestyle, and gut dysbiosis. Hyperandrogenism, insulin resistance, and chronic low-grade inflammation are central mechanisms. Complications include infertility, menstrual irregularities, dyslipidaemia, type 2 diabetes, and cardiovascular risk. Psychological issues such as anxiety, depression, and low self-esteem are highly prevalent. Nutraceuticals (inositols, vitamins D/E/B12, omega-3, selenium, magnesium) improve metabolic and hormonal parameters. Nutraceuticals (inositols,

vitamins D/E/B12, omega-3, selenium, magnesium) have shown to improve metabolic and hormonal parameters. While Ayurvedic herbs (Shatavari, Yashtimadhu, Lodhra, Kumari) show benefits for menstrual regulation, ovarian function, and hormonal balance. In addition, Probiotics and omega-3 fatty acids have shown to contribute to improved insulin sensitivity and reduced inflammation.

Conclusion: PCOS is a systemic, multifactorial disorder requiring an integrative and personalized approach. Early diagnosis is essential due to associations with diabetes, dyslipidaemia, and cardiovascular disease. Management requires combining lifestyle changes, diet, exercise, stress reduction, nutraceuticals, and appropriate medications. A multidisciplinary, individualized care model is crucial to reducing PCOS's global health burden.
Applications: Can guide clinicians in holistic PCOS management. Also useful for developing patient-centered nutritional and lifestyle intervention plans. Beneficial for creating educational materials, awareness campaigns, and public health strategies for women's reproductive health.

Keywords: Polycystic Ovary Syndrome, Hyperandrogenism, Insulin Resistance, Environmental Endocrine Disruptors

Antioxidant and cytotoxic potential of barnacle *Amphitrite Amphibalanus*

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ABSTRACT

Marine organisms represent an underexplored reservoir of structurally unique secondary metabolites with significant pharmaceutical potential, particularly in cancer drug discovery. The present study investigates the Zoochemical composition, fatty acid profile, antioxidant potential, and cytotoxic activity of methanolic extracts derived from *Barnacle* (BME) highlighting their relevance as novel marine bioactive sources. Preliminary zoochemical screening revealed the presence of alkaloids, phenolics, terpenoids, saponins in BME extract, with BME exhibiting markedly higher alkaloid and phenolic content. GC–MS analysis confirmed 37 fatty acids, dominated by hexadecanoic acid methyl ester, methyl stearate, eicosapentaenoic acid methyl ester (EPA), and docosahexaenoic acid (DHA). BME extracts displayed significant antioxidant activity across DPPH, nitric oxide, hydroxyl radical scavenging, FRAP, and total antioxidant capacity assays. Cytotoxicity assessment of BME showed inhibition of A549 lung cancer and MCF-7 breast cancer. These findings suggest that barnacle possess potent antioxidant constituents and cytotoxic properties, supporting their potential as promising leads for marine-derived anticancer drug development.

Keywords: *Amphibalanus amphitrite,* secondary metabolites, antioxidant, cytotoxicity, anticancer.

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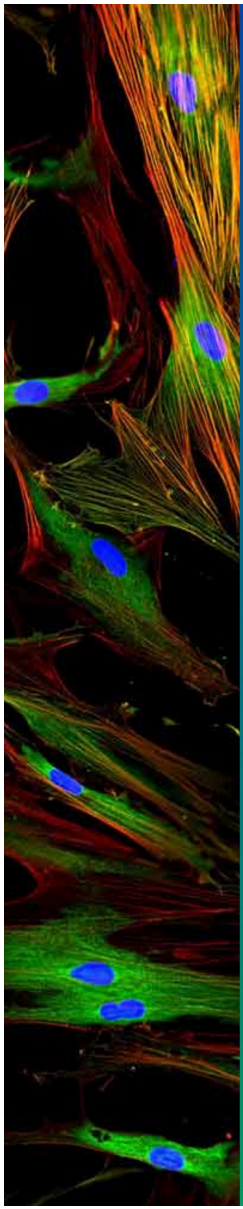

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