SWAMI VIVEKANANDA UNIVERSITY,
BARRACKPORE

SCHOOL OF LIFE SCIENCES

DEPARTMENT OF BIOTECHNOLOGY

DECEMBER-AUGUST NEWSLETTER

2025

SWAMI VIVEKANANDA UNIVERSITY,
BARRACKPORE

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SWAMI VIVEKANANDA UNIVERSITY,
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ABOUT THE DEPARTMENT

The Department of Biotechnology, part of the School of Life Sciences at Swami Vivekananda University, is dedicated to supporting a group of ambitious individuals on their journey to excellence, providing them with an ideal platform for self-redefinition. The department accommodates a diverse range of students, including postgraduates, undergraduates, and PhD scholars, in addition to academic staff that includes emerging researchers.

With a focus on achieving great heights, the department offers a highly specialized laboratory infrastructure that encompasses four labs specializing in Biotechnology, Microbiology, Molecular Biology & Biochemistry, Plant Biotechnology, and Bioengineering. The library is stocked with a collection of well-informed books in relevant fields, creating a continuous space for students to explore the latest developments. The perfect blend of theoretical knowledge and practical application is facilitated through classes held in spacious classrooms and well-equipped labs. This setup provides students with an essential environment for experiential learning, personal development, and successful placement in reputable industries. The department places a strong emphasis on exposure through internships, hands-on training, and industry visits, ensuring a comprehensive educational experience for its students.

SWAMI VIVEKANANDA UNIVERSITY,
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MISSION

Our mission lies in the translation of academic knowledge into practical application is a key focus, emphasizing outcome-based teaching approaches. Central to our educational philosophy is the establishment of a cooperative relationship between the industry and academia, fostering a dynamic exchange of ideas and experiences. Our commitment extends to conducting research that addresses local, national, and global challenges, ensuring that our academic endeavors have a meaningful impact on the broader community.

Furthermore, we are dedicated to developing graduate students who are not only well-versed in their academic disciplines but also equipped with robust analytical and leadership skills. Through this holistic approach, we aim to prepare our students to navigate and contribute effectively to the complex demands of their chosen fields, fostering a new generation of professionals capable of making significant and positive contributions to society.

SWAMI VIVEKANANDA UNIVERSITY,
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VISION

In the Biotechnology department, our focus lies in seamlessly translating academic knowledge into practical applications. We employ outcome-based teaching methodologies to enhance the learning experience, ensuring that students acquire not only theoretical understanding but also practical skills. A key aspect of our approach involves establishing a cooperative relationship between the industry and academia, creating opportunities for students to engage with real-world challenges and industry practices. Our commitment extends to conducting impactful research that addresses issues at local, national, and global levels, contributing to the advancement of biotechnological knowledge. Moreover, we aim to develop graduate students who not only possess a strong academic foundation but are also equipped with analytical and leadership skills, empowering them to thrive in the dynamic field of biotechnology.

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OBJECTIVE

1. **Academic Excellence:** Our commitment is to deliver high-quality education and training across diverse academic levels within the expansive field of biotechnology.

1. **Cutting-Edge Research:** We foster a culture that encourages innovative and impactful research, pushing the boundaries of biotechnological sciences.

1. **State-of-the-Art Facilities:** Our dedication extends to maintaining and upgrading specialized laboratories that provide students with practical learning experiences at the forefront of biotechnology.

1. **Interdisciplinary Collaboration:** We actively seek collaborations with other departments, research institutions, and industries, fostering interdisciplinary approaches to biotechnological research.

1. **Holistic Learning:** Through the integration of theoretical knowledge and hands-on practical experiences, we emphasize the diverse applications of biotechnology to provide a comprehensive educational experience.

1. **Library Resources:** Our comprehensive library boasts a rich collection of resources tailored to the field of biotechnology, supporting the academic endeavors of our students.

1. **Industry Exposure:** Students benefit from internships, hands-on training, and industry visits, gaining valuable insights into the real-world applications of biotechnological principles.

1. **Ethical Practices:** We instill a strong sense of ethical conduct and responsibility in both research and professional practices within the field of biotechnology.

OBJECTIVE

9. **Global Perspective:** Our programs are designed to prepare students for success in a diverse and interconnected professional landscape, providing a global perspective on biotechnological challenges and opportunities.

10. **Community Engagement:** We actively engage with the community through outreach programs and collaborative initiatives, emphasizing the application of biotechnological solutions for societal benefit.

11. **Continuous Improvement:** In response to evolving trends and challenges in biotechnology, we maintain a dynamic curriculum, ensuring the highest standards of education and research.

SWAMI VIVEKANANDA UNIVERSITY,
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PROGRESS REPORT

DECEMBER- 2024

One-Day Hands-On Training Workshop on Forensic Analysis of Body Fluids

A One-Day Hands-On Training Workshop on "Forensic Analysis of Body Fluids," organized by the School of Life Sciences at Swami Vivekananda University, Barrackpore, in collaboration with SHRM Biotechnologies Pvt. Ltd., aimed to inspire students by demonstrating real-life applications of theoretical concepts. During the event, a Memorandum of Understanding (MoU) was also signed between Swami Vivekananda University and SHRM Biotechnologies to foster future collaborations.

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PROGRESS REPORT

DECEMBER- 2024

The 10-day journey of knowledge, innovation, and inspiration concluded on a high note with an amazing group of students from Swami Vivekananda University

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BARRACKPORE

PROGRESS REPORT

JANUARY- 2025

Industry-Academia Meet, 2025

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PROGRESS REPORT

JANUARY- 2025

LinkedIn & Resume Writing Workshop

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PROGRESS REPORT

February- 2025

The International Conference on Science and Technological Innovations in Agriculture Life Sciences and Food & Nutrition, 2025

The International Conference on Science and Technological Innovations in Agriculture Life Sciences and Food & Nutrition, 2025 was held from 4th to 6th February 2025 at Swami Vivekananda University, organized by the Department of Agriculture, Food and Nutrition, Biotechnology and Microbiology.

The event brought together renowned scientists, academicians, and industry experts to discuss recent advancements in agriculture, life sciences, and nutrition. Key speakers included Prof. Michael Jones, Prof. (Dr.) Subrata Basu Roy, Dr. Ameen Chowdhury, and many more from India and abroad.

The conference provided a valuable platform for knowledge exchange, collaboration, and exploring innovative solutions for sustainable development in the field.

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PROGRESS REPORT

February- 2025

Nirman Mela Start-up Fair

This three-day event is a golden opportunity for innovators, entrepreneurs, and aspiring startups to showcase their creative ideas and groundbreaking solutions. Students from Biotechnology and Microbiology participated in the event with their products .

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PROGRESS REPORT

April- 2025

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PROGRESS REPORT

April- 2025

One day Seminar on Infectious Diseases
Guest Speaker: Dr. Sayantan Banerjee, Associate Professor, In-charge of Infectious Diseases Division, AIIMS Kalyani

A **One-Day Seminar on Infectious Diseases** was conducted with a focus on current challenges and advancements in the field. The seminar featured **Dr. Sayantan Banerjee**, Associate Professor and Incharge of the Infectious Diseases Division at **AIIMS Kalyani**, as the guest speaker.

Dr. Banerjee delivered an insightful session covering emerging infectious threats, diagnostic approaches, and public health strategies. The seminar provided students and faculty with a valuable opportunity to engage with real-world clinical perspectives and deepen their understanding of infectious disease management.

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PROGRESS REPORT

May - June - 2025

Student Placement

The recent placement and internship drive yielded promising results. Cliniops selected one undergraduate and one post graduate candidate, and Sundarini Naturals hired one postgraduate candidate. Internships with potential for permanent roles were secured by one postgraduate candidate each at Disha Eye Hospitals, while one postgraduate student started internship at Indus Pharma in July 2025, with prospects for permanent positions.

Name of the Company	Number of Students Selected
Indus Pharma Pvt Ltd	2
Juvenus drug	5
GCBC vaccines pvt. Ltd	3
Covalent Lab Pvt Ltd	5
Stemcyte India Therapeutics Pvt Ltd	1
CliniOps Pvt. Ltd.	3
Fresenius Kabi Oncology Limited	1
Farbe Firma Pvt Ltd	2
Bose informatics	1
Sundarini Naturals Organic	2
Abbott Laboratories	1
Lupin Ltd.	1
Bi Biotech	2
Mednipur Milk Union	2
Dialysis Technologist	1
Geo nutri foods private limited	1
Integrity Healthcare Solutions Pvt Ltd	1
AAL biosciences research pvt ltd	1
SHRM	2
Disha Eye Hospitals	1
EPUB solutions pvt ltd	2
Floating Chip Technology	1
EdLernity	1

SWAMI VIVEKANANDA UNIVERSITY,
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PROGRESS REPORT

June - 2025

Student Internship

Our B.Sc. Biotechnology Semester V and Post graduate Semester III went for internship program after their term end exam to bridge the gap between theory learnings and practical knowledge. Every year this internship drive yielded promising results in terms of their interest to the subject as well as real world experience in scientific laboratory. Our students enthusiastically participated in Frontiers in Disease Biology Conference and Bio-analytical Workshop (BAW 2025) from 27th June to 1st July, organized by IISER, Kolkata. Hands on Workshop includes Preclinical animal mouse models, translating basic science to clinic. Near about 41 undergraduate and 15 post graduate students participated in BAW 2025 at IISER Kolkata. There is another internship organized for the rest of 20 undergraduate students at Centre for Laboratory Animal Research & Training (CLART), Kalyani on the topic of animal handling and ethics, flow cytometry, histopathology and confocal microscopy from 23rd to 27th June, 2025.

SWAMI VIVEKANANDA UNIVERSITY,
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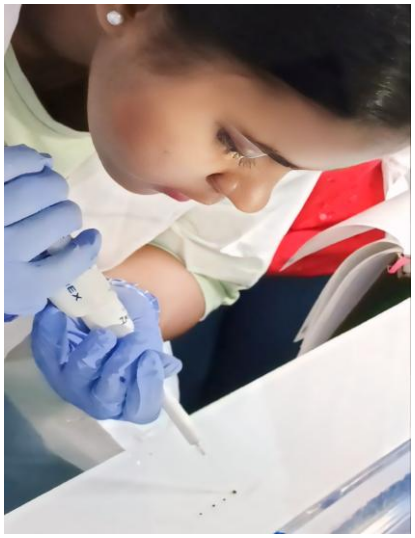
PROGRESS REPORT

June - 2025

Student Internship

Our B.Sc. Biotechnology Semester III went for internship program after their term end exam to bridge the gap between theory learnings and practical knowledge. Total 30 students did two weeks internship at InBol Healthcare Pvt Ltd, Kolkata on basic molecular biology techniques. Whereas, remaining students completed their internship at SHRM Biotechnologies Pvt Ltd. on basic microbiological practical.



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BARRACKPORE

PROGRESS REPORT

JUNE - 2025

Project Grant Received & Collaboration

The Department of Biotechnology at SVU has secured significant grants and collaborations. Dr. Debjit De is involved in two collaborations. One is an international project with Dr. Ayan Roy from the Asian University for Women, Bangladesh, focusing on the gut microbiome's role in multiple sclerosis (MS) and long COVID-19. The project aims to identify microbiome biomarkers for improved MS diagnosis.

Additionally, Dr. De is collaborating nationally with Dr. Chittabrata Mal and Dr. Subhankar Choudhury on a project investigating the gut microbiome’s role in Gestational Diabetes Mellitus (GDM). The research aims to understand microbial diversity in GDM and develop microbiome-targeted therapies for better disease management in pregnant women. These efforts highlight the department's commitment to impactful research.

Dr. Priyajit Banerjee is selected for Short term Minor research fund from our own Swami Vivekananda University’s seed grant. The project will deal with exploring the protective therapeutic effect of melatonin and melatonin derived compounds against neonicotinoid insecticide including oxidative damage, mitochondrial dysfunction and neurotoxicity.

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PROGRESS REPORT

JULY - 2024

Undergraduate Induction Programme -2025

The induction program for the newly admitted undergraduate batch of Biotechnology at the School of Life Sciences, Swami Vivekananda University, commenced on 14th July, 2025 with a series of impactful sessions designed to set the stage for academic and professional success.

A key highlight of the program was an insightful lecture by Dr. Rupak Roy, Chief Scientist, SHRM Pvt. Ltd. His session focused on bridging the gap between industry and academia, offering students a deeper understanding of how their academic knowledge translates into real-world applications. He shared valuable insights into industry practices, emerging technologies, and career opportunities, inspiring students to align their learning with industry expectations.

The induction program also introduced students to the foundational and applied aspects of microbiology and biotechnology, emphasizing their significance in addressing contemporary global challenges. It included interactive discussions on emerging trends, advancements, and job market dynamics.

This comprehensive initiative not only motivated students but also provided them with a strong academic and professional foundation, ensuring they are well-prepared to navigate their undergraduate journey and beyond.

SWAMI VIVEKANANDA UNIVERSITY,
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PROGRESS REPORT

JULY - 2025

Undergraduate Induction Programme -2024

Activity
Induction Program Commencement, PowerPoint Presentation (SP)
NPTEL Enrolment (DD) Introduction to Biotechnology & Quiz Competition (SS1, PP1)
Searching Research Paper (PP3) Introduction to environmental biotechnology & Poster presentation competition (BG, SS2)
Grooming & Personality Development (PB) Pipetting technique competition (RDB)
Lab visit & Treasure hunt (SS1, PP1)
Documentary movie Post movie analysis competition (SG1)
Lab visit & Videography (SS2) PowerPoint presentation competition (BG)
Microscopy (RDB) Image focussing & diagram competition (SS1)
Industrial expert talk Reels competition (SS1, PP1)
Industrial expert talk First Semester Roadmap (SB)
Documentary movie Post movie analysis competition (SG1) Role play on Biotechnology

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PROGRESS REPORT

July- 2025

Two-weeks Hands-on Faculty Development Program on "Innovations in Indian Higher Education: Promoting Holistic Multidisciplinary & Inclusive Teaching Learning & Governance" organized by School of Life Sciences from 7th to 19th July, 2025

The workshop was designed for faculty members to gain practical exposure to NAAC criteria, Teaching learning practices, IPR and capacity building. Sessions were taken by Principals of different colleges and our senior faculty members of SVU.

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PROGRESS REPORT

July- 2025

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PROGRESS REPORT

July- 2025

6-day Hands-on Training Workshop on "Advanced Biological Instruments: Enhancing Research & Practical Skills" from 21st to 26th July, 2025

A 6-day Hands-on Training Workshop on "Advanced Biological Instruments: Enhancing Research & Practical Skills" commenced on 21st July 2025 at Swami Vivekananda University, organized by the Departments of Microbiology & Biotechnology, School of Life Sciences.

The workshop was designed for students, scholars, and faculty members to gain practical exposure to modern biological instrumentation techniques. Sessions focused on hands-on training to build competence in operating and understanding advanced lab equipment critical for bioscience research.

Participants from various institutions attended, with registration fees set at ₹1000 for faculty, ₹750 for scholars, and ₹500 for students. The initiative significantly contributed to skill development and academic enrichment in the field of life sciences. A total of 140 outside participants took part in the workshop from various colleges and universities across India.

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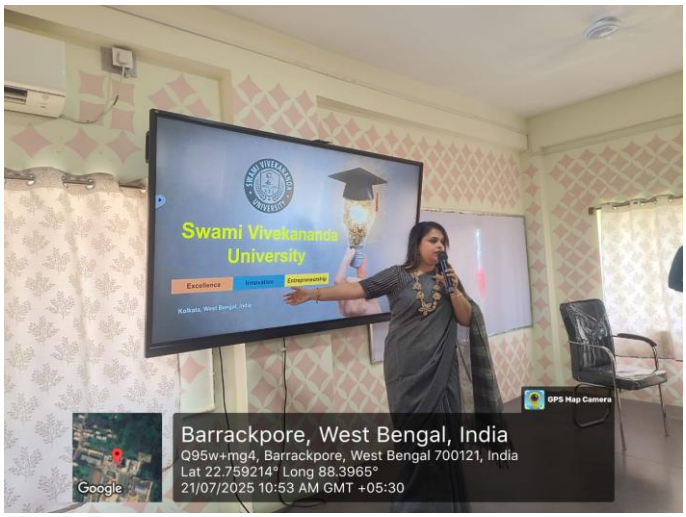
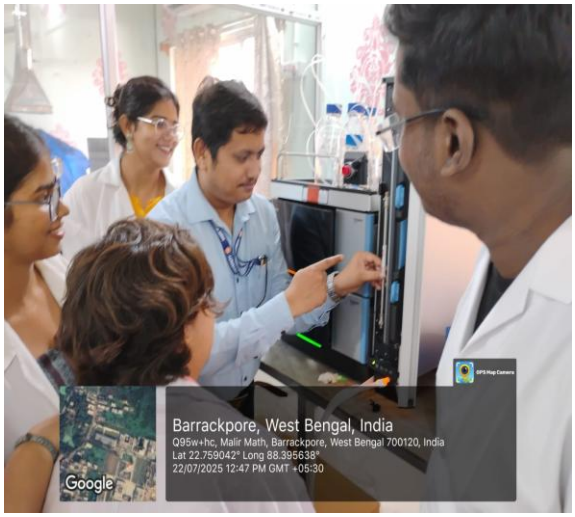
PROGRESS REPORT

July- 2025





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PROGRESS REPORT

AUGUST - 2025

4-days Hands-on Training Workshop on “Next Gen Bioresearch: Tools and Techniques in Research Methodology & Computational Biology" from 19th to 22nd August, 2025

Participants from various institutions attended, with registration fees set at ₹500 for scholars and ₹300 for students. The initiative significantly contributed to manuscript writing, research proposal designing and software handling for references. Additionally, Hands on . Session was there on topic of biological databases, sequence similarity searching, protein modeling, molecular interactions, visualization tools etc. A total of 45 outside participants took part in the workshop from various colleges and universities across India.

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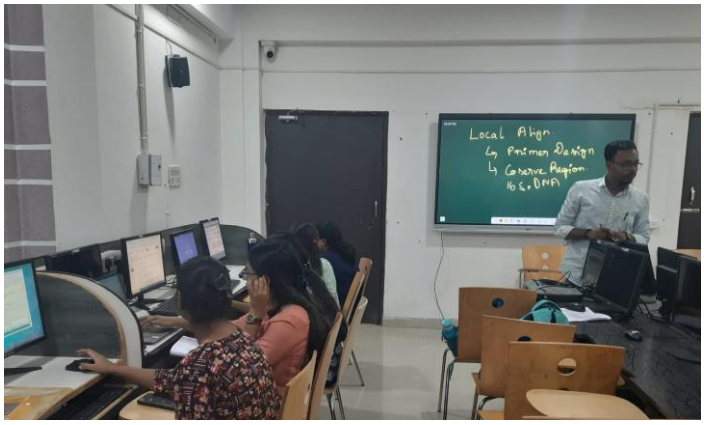
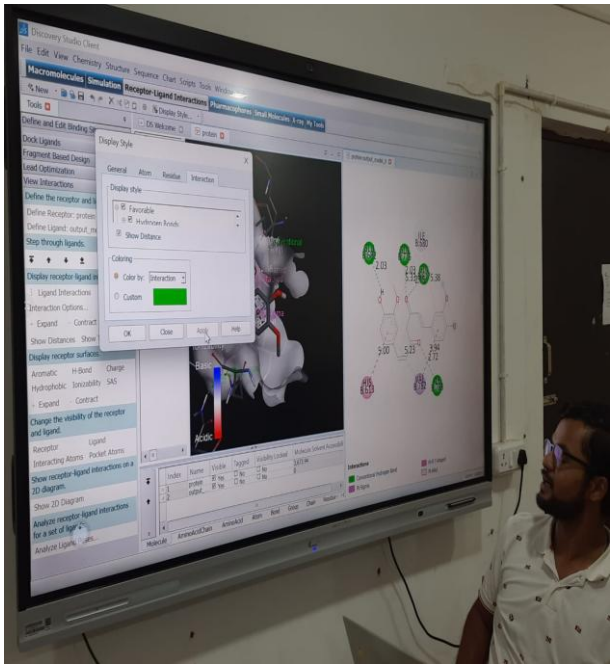
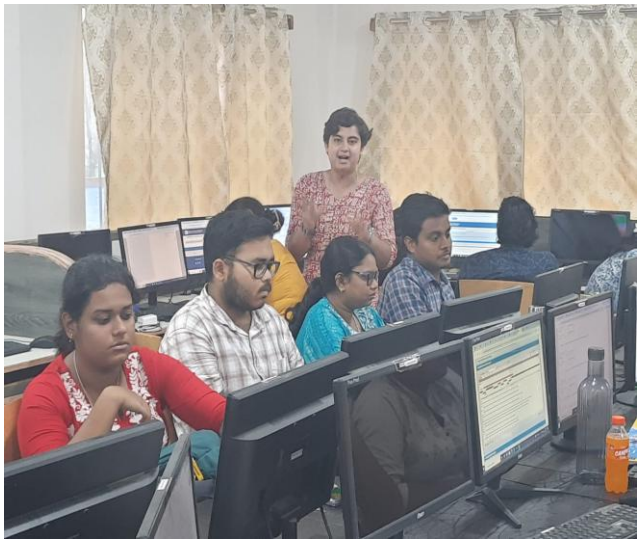
PROGRESS REPORT

AUGUST - 2025







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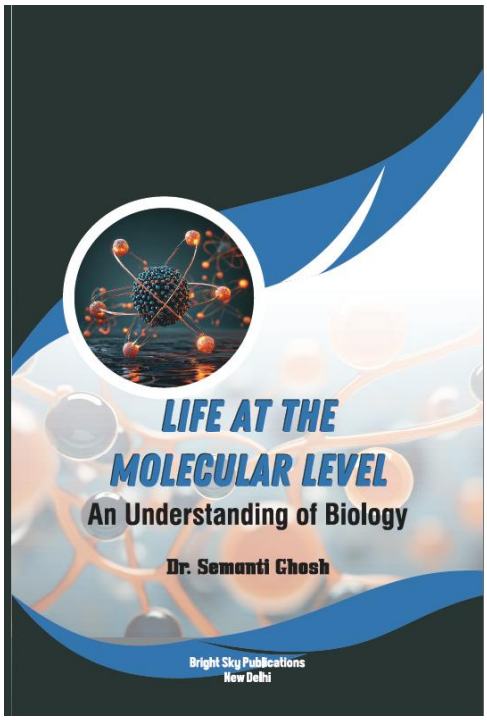
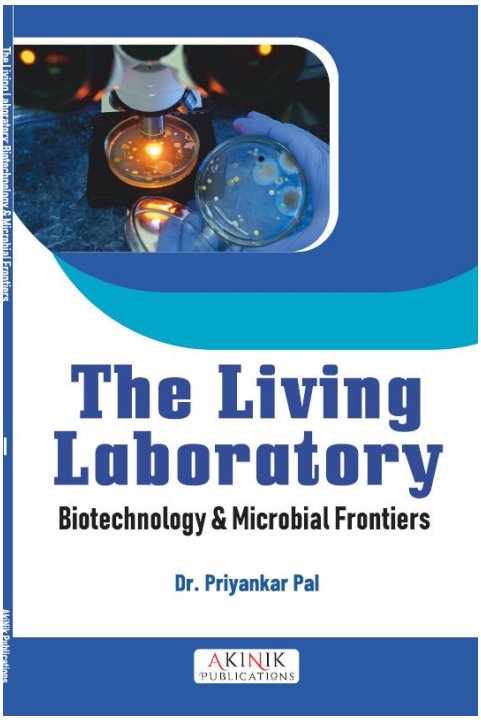
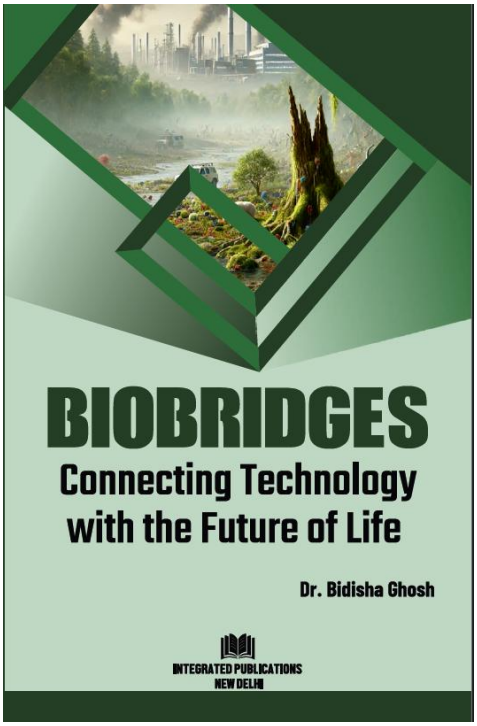
PROGRESS REPORT

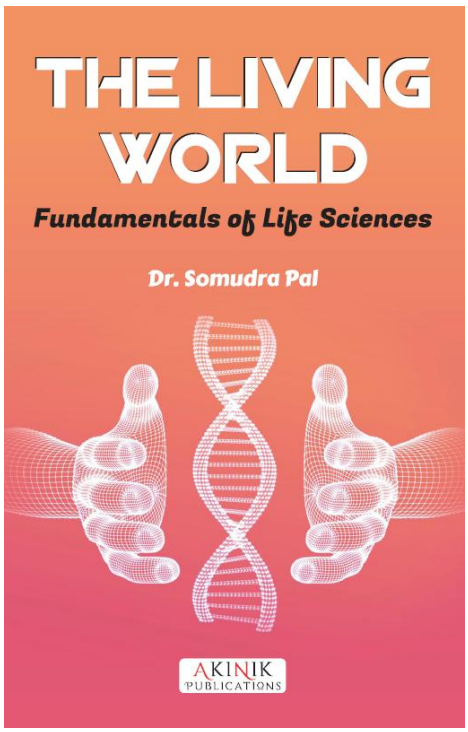
January – June 2025

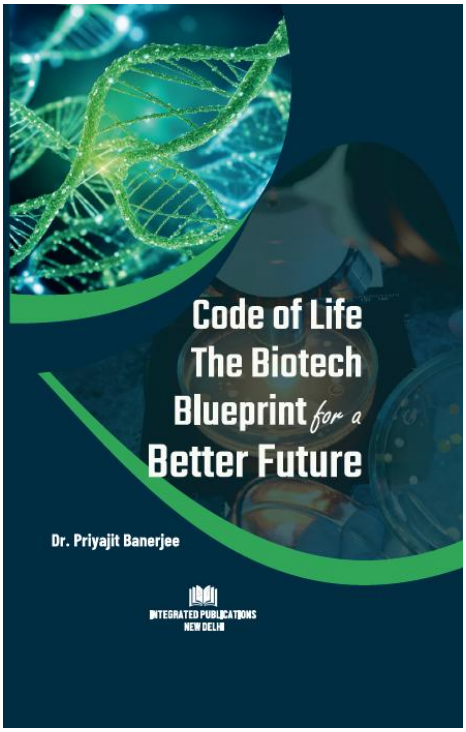
Publication of Book

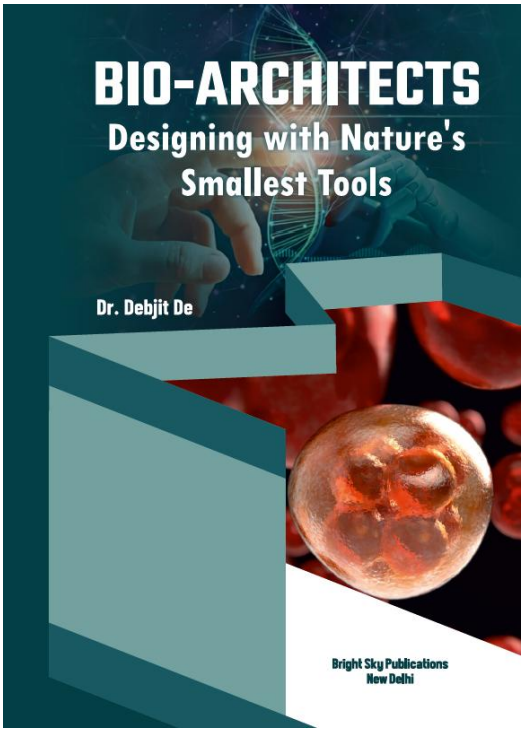












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PROGRESS REPORT

December 2024 – August 2025

Publication of Research Article

Molecular Biotechnology
https://doi.org/10.1007/s12033-025-01407-7

ORIGINAL PAPER

Analyzing the Molecular Signature Genes and Pathways of Dengue Fever, Dengue Hemorrhagic Fever and Dengue Shock Syndrome Caused by Dengue Virus in India

Debojyati Datta[1] · Semanti Ghosh[1]

Received: 7 September 2024 / Accepted: 28 January 2025

Abstract
Dengue fever, dengue hemorrhagic dengue fever and dengue shock syndrome were caused by Dengue mosquito bites. Common signs such as fever and headache, are connected to distinctive medical disorders. From the previous and ongoing studies, it is far unknown what genes or protein signaling pathway mechanism underlies the association between DF, DHF and DSS in Indian context. In our study, the gene expression dataset was retrieved from the GEO database with accession number GSE94892. Here, mRNA sequence analysis done of each DF, DHF and DSS patients from peripheral blood mononuclear cells sample. GEO2R became used to carry out differential gene expression analysis using a dengue data set. Protein–protein interaction networks have been built, gene set GO enrichment and KEGG Pathway enrichment done in SR plot, and cluster analyses have been performed in STRING and MCODE. During this study, we diagnosed 10 hub genes in all 3 condition. The gene set of showed that the ten hub genes diagnosed in each condition constituted the best range of common hub genes discovered beneath all 3 conditions in India. The conclusion of this study can be beneficial for treating DF, DHF and DSS conditions within the context of handling DEV in India.

Keywords CytoHubba · Cytoscape · Dengue fever · Dengue hemorrhagic fever · Dengue shock syndrome · Gene expression · Hub genes · India

Abbreviations

ABL1	Tyrosine-protein kinase ABL1	COVID-19	Coronavirus disease 2019
ACOD1	Aconitate decarboxylase 1	CXCR3	CXC motif chemokine receptor 3
AMPK	Adenosine monophosphate activated protein kinase	CYBRD1	Cytochrome B reductase 1
		DDX58	DEAD box polypeptide 58
APCC	Anaphase promoting complex/ cyclosome	DEG	Differentially expressed gene
		DEV/DENV	Dengue virus
BRD1	Bromodomain containing 1	DF	Dengue fever
CB3	Human coxsackievirus B type 3	DHF	Dengue hemorrhagic fever
CCNB1	Cyclin B1	DICER1	Endoribonuclease dicer 1
CCNB2	Cyclin B2	DNA	Deoxyribonucleic acid
CDC73	Parafibromin	DNM1L	Dynamin 1 like protein
CDK19	Cyclin-dependent kinase 19	dsRNA	Double-stranded ribonucleic acid
		DSS	Dengue shock syndrome
		EMCV	Encephalomyocarditis virus
		FCROS	Fold change rank ordering statistics
		FDR	False discovery rate
		FXR2	Fragile X mental retardation syndrome related protein 2
		FZR1	Fizzy and cell division cycle 20 related 1

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Published online: 22 February 2025

Springer

Biotechnology and Applied Biochemistry

WILEY

ORIGINAL ARTICLE

Probiotic and Synbiotic Isolates From Whey Water and Fermented Rice Water Exert Compelling Wound-Healing Efficacy in a Diabetic Mouse Model

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Received: 20 December 2024 | **Accepted:** 6 June 2025

Keywords: diabetes mellitus | diabetic ulcers | microbial modulation | probiotic supplementation | wound-healing therapies

ABSTRACT
Probiotics serve as essential wound healers, particularly in diabetic patients, where they eliminate the interfering hindrance caused due to enhanced oxidative stress, inflammation, and microbial imbalances. Probiotic strains are also reported to enhance the level of tissue regeneration-specific cytokines and growth factors. Similarly, probiotics also stop infections by preventing the growth of harmful bacteria at the lesion site, which may be helpful for susceptible diabetic ulcers. Thus, probiotics may be a viable adjuvant treatment to hasten the healing of diabetic wounds. The present study aims to evaluate the efficacy of probiotic and synbiotic supplementation on wound healing in diabetic mice. Accordingly, probiotic strains *Bacillus cereus* strain BWN SC and *Bacillus aerophilus* strain BWN SC were isolated from whey water and fermented rice water on MRS agar media. Their wound-healing potential was investigated in male Swiss albino mice. Initially, streptozotocin was used to induce diabetes in the animals, after which 3 mm subcutaneous puncture wounds were induced on the dorsal region. Next, they were treated with different probiotics or synbiotics applied topically on the wounded area. Simultaneously, oral supplementation of the respective strains was also done using gavage. Wound contraction rate was studied at intervals of 1, 5, 10, and 14 days, followed by subsequent histological assay and hematological analysis. Animals treated with probiotics and synbiotics supplementation showed a faster wound contraction rate as compared to the control. Hematological analysis also showed improved wound-healing parameters in the treated mice. Thus, isolated probiotic strains can be effectively used for wound healing in diabetic mice. They can be combined with prebiotics to get even more potent therapeutic tool in the form of synbiotics.

Science of the Total Environment 978 (2025) 179458

Contents lists available at ScienceDirect

Science of the Total Environment

journal homepage: www.elsevier.com/locate/scitotenv

ELSEVIER

Impact of metformin on gene expression in Burmese loach (*Lepidocephalichthys berdmorei*) from Manipur, India

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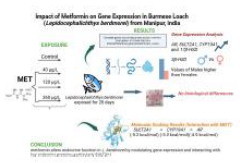
HIGHLIGHTS

- Metformin exposure alters endocrine gene expression in *Lepidocephalichthys berdmorei*.
- Significant upregulation of AR, SULT2A1, CYP19A1, 17β-HSD, and 3β-HSD in males.
- Molecular docking shows that SULT2A1 has the strongest interaction with metformin.
- MD simulations confirm stable binding and structural deviations in SULT2A1.
- *L. berdmorei* serves as a potential model for assessing xenoestrogens in freshwater.

GRAPHICAL ABSTRACT



ARTICLE INFO

Editor: Daniel Wunderlin

Keywords:
Metformin
Endocrine disruption
Burmese loach
Gene expression
Molecular docking
Molecular dynamics
Aquatic toxicology

ABSTRACT

Pharmaceutical contaminants like metformin, a widely used antidiabetic drug, pose emerging threats to aquatic ecosystems. This study investigates the endocrine-disrupting effects of metformin on Burmese loach (*Lepidocephalichthys berdmorei*), a bio-indicator species in Manipur's freshwater systems. Fish were exposed to 40 µg/L, 120 µg/L, and 360 µg/L of metformin for 28 days, and effects on gene expression, gonadal histology, and molecular interactions were assessed. Gene expression analysis revealed significant upregulation of *AR*, *SULT2A1*, *CYP19A1*, and *17β-HSD* in metformin-treated males ($p < 0.05$). *3β-HSD* was notably elevated at 360 µg/L. Despite these molecular changes, no histological differences were observed between treated and control groups. Molecular docking showed that SULT2A1 had the strongest interaction with metformin (−5.2 kcal/mol), followed by CYP19A1 (−5.0 kcal/mol) and AR (−4.9 kcal/mol). Molecular dynamics (MD) simulations confirmed the stability of the SULT2A1-metformin complex, with reduced RMSD, compactness, and residue fluctuations at the active site. The binding free energy (ΔG) of −5.24 kcal/mol further supports this stable interaction. Additionally, structural deviations were observed in SULT2A1 upon metformin binding, suggesting potential functional alterations. These findings suggest that metformin alters endocrine function in *L. berdmorei* by modulating gene expression and interacting with key endocrine proteins, particularly SULT2A1. As *L.*

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https://doi.org/10.1016/j.scitotenv.2025.179458
Received 28 December 2024; Received in revised form 28 March 2025; Accepted 14 April 2025

BBA - Molecular Basis of Disease 1871 (2025) 167580

Contents lists available at ScienceDirect

BBA - Molecular Basis of Disease

journal homepage: www.elsevier.com/locate/bbadis

ELSEVIER

CD36 inhibition corrects lipid-FetuinA mediated insulin secretory defects by preventing intracellular lipid accumulation and inflammation in the pancreatic beta cells

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ARTICLE INFO

Keywords:
CD36
FetuinA
TLR4
Lipid accumulation
Inflammation
Insulin secretion

ABSTRACT

CD36 is a multifunctional protein involved in long chain fatty acid uptake and immune modulation in different cells. Recently it was reported that increased expression of CD36 is evident in the islets of diabetic obese individuals. In this present study we investigated the role of CD36 in regulating intracellular lipid accumulation and inflammation in beta cells and its implication on secretory dysfunction. Additionally, we have elucidated the potential role of fetuinA, a circulatory glycoprotein and an endogenous ligand of TLR4, for aggravating lipid accumulation and insulin secretory defects in beta cells. MIN6 mouse insulinoma cells when incubated with palmitate and fetuinA together showed activation of TLR4-NFkB inflammatory cascade and increased uptake of palmitate, which was rescued by CD36 functional inhibition or knockdown. Moreover, glucose stimulated insulin secretion was restored with consequent downregulation of IL-1β secretion. TLR4 inhibition also decreased intracellular lipid content with a reduction of CD36, suggesting functional crosstalk between them. At physiological level, excess fetuinA in the islet milieu of HFD fed C57BL/6J mice or exogenous fetuinA administration (i.p.) promoted lipid accumulation in the islets resulting in decreased insulin secretion with increased CD36 expression. Interestingly, CD36 inhibition in HFD mice with a pharmacological inhibitor Salvianolic acid B attenuated inflammation, reduced intracellular lipid accumulation in beta cells and restored insulin secretory function. Therefore, our results suggest that inhibition of CD36 protects beta cells from the derogatory effects of lipid and fetuinA and restores secretory function and can be considered as a therapeutic target for obesity mediated beta cell dysfunction.

SWAMI VIVEKANANDA UNIVERSITY,
BARRACKPORE

PROGRESS REPORT

December 2024 – August 2025

Publication of Research Article

Molecular Biology Reports (2025) 52:773
https://doi.org/10.1007/s11033-025-10882-9

ORIGINAL ARTICLE

Men with genetic predisposition face greater fertility challenges when exposed to electromagnetic radiation

Samudra Pal[1,2] · Pranab Paladhi[1] · Saurav Dutta[1] · Papiya Ghosh[3] · Ratna Chattopadhyay[4] · Sujay Ghosh[1]

Received: 21 June 2025 / Accepted: 25 July 2025

Abstract

Purpose This study investigates the synergistic effects of genetic variants in core meiotic regulator genes—**SPO11**, **RNF212**, and **SYCP3**—and co-occurring exposure to electronic radiation as risk factors for azoospermia among Bengali-speaking men from West Bengal, India.

Materials and methods A total of 708 azoospermic individuals, who tested negative for Y chromosome microdeletions, and 640 healthy controls were genotyped using Sanger's dideoxy sequencing. Genetic variants identified included SPO11 rs3764674T>G, MN650122delA, MN708963insA, MN708964insA, MN720359T>A; RNF212 MN737491delA, rs4045481C>T; and SYCP3 rs10860779C>A, MN901901delA, and MN995822delA. Binary logistic regression was used to assess the interaction between genetic variants, electronic radiation exposure, and age, with fertility status as the outcome variable.

Results The analysis revealed a significant association between genetic variations in meiotic regulators and increased risk of azoospermia, particularly among men aged 30 years or older who were exposed to electronic radiation. The findings suggest that effect of electronic radiation may exacerbate meiotic errors, impair germ cell development, and further reduce fertility in affected individuals.

Conclusions Men carrying genetic variations in SPO11, RNF212, and SYCP3 and exposed to electronic radiation are at an elevated risk of azoospermia, particularly with advancing age. This information may be considered in routine screening of assisted reproductive technology (ART) practices, which will enable clinicians to tailor management strategies for male infertility.

Original Article

Novel Genetic Variants of CDC25A Significantly Increase Risk of Spermatogenesis Arrest in Men from Bengali Population, India: A Cross-Sectional Study

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ABSTRACT

Background: Idiopathic azoospermia is one of the most common reasons for male infertility, but little is known about its genetic origins. The CDC25A gene, a meiotic core regulator, encodes a phosphatase that triggers the G1/S transition of meiosis. It dephosphorylates and activates CDK2, as well as enhances CDC2-cyclin E, CDK2-cyclin A and CDK1-cyclin B complex formation, which is crucial for chromosome condensation and progression of meiosis. **Aim:** The aim of this study was to identify individual variants of the CDC25A gene that make men susceptible to idiopathic azoospermia. **Setting and Design:** Genetic association study comparing the CDC25A gene in men with idiopathic azoospermia. **Materials and Methods:** The coding sequence of the entire CDC25A gene was sequenced in a population of azoospermic men. Recently discovered heterozygous mutations were assessed using *in silico* prediction tools to determine their possible pathogenicity. **Statistical Analysis Used:** Bioinformatics software such as SIFT, PolyPhen-2 and MutationTaster were applied to forecast the functional consequence of detected variants. **Results:** Novel heterozygous mutations were found in CDC25A. Variants present only in azoospermic men were evaluated for their pathogenicity, indicating their potential involvement in infertility. **Conclusion:** This work identifies new CDC25A gene variants that may be linked with idiopathic azoospermia. These discoveries add to the knowledge of the genetic aetiology of male infertility and could contribute to the development of future diagnostics and treatments.

KEYWORDS: *Azoopermia, CDC25A, genetic variants*

INTRODUCTION

Idiopathic azoospermia is a serious condition of male infertility where there is no sperm in the ejaculate with no apparent cause. Although several environmental and hormonal factors have been suspected, increasing evidence points towards the role of genetic factors in the impairment of spermatogenesis. Amongst them, meiotic regulator genes are of specific interest since they control the major cell cycle transitions that are vital for sperm development. The CDC25A gene, an example of such a genetic determinant, plays a critical role in activating some key cyclin-dependent kinases in the G1/S and G2/M transitions.[1,2] Therefore, the function of these molecules may be disrupted leading to impaired spermatogenesis. This study aims to recruit Bengali-speaking individuals for a determination of whether there exist specific CDC25A variants which may predispose men to idiopathic azoospermia. Through full-length coding-region sequencing of CDC25A

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Received: 07-02-2025 **Revised:** 17-02-2025
Accepted: 22-02-2025 **Published:** 29-03-2025

RESEARCH ARTICLE

Rare and novel variant load threshold for *KIF7*, *GJA1* and *PDE1C* genes elevates the risk of severity of congenital heart defects in Down syndrome

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Abstract

Individuals with Down syndrome (DS) exhibit a higher incidence of congenital heart defects (CHD). The objective of the present study was to investigate ethnicity-specific genetic variants that increase the risk of CHD in children with DS from the Indian Bengali population. We conducted whole exome sequencing of the genomes of Down syndrome children with and without CHD and subsequently tested the identified variants in a larger cohort (N = 1798). Our findings revealed two rare variants, *KIF7* rs138354681 and *GJA1* rs778110855, as well as one novel variant, *PDE1C* PP785745, present in children with DS and CHD but absent in those without CHD. In-silico analyses indicated that these variants are pathogenic. The frequencies of the heterozygous genotypes for *KIF7* rs138354681, *GJA1* rs778110855, and *PDE1C* PP785745 were recorded as 0.027, 0.016, and 0.032, respectively. Among the 31 carriers identified, 18 individuals exhibited two variants, while four were found to have three co-occurring variants. The majority of these individuals required surgical intervention for correction, in contrast to single variant carriers, of whom only three out of nine needed surgeries. A polygenic risk score analysis revealed higher score to be significantly associated with both the presence of multiple variants and the subsequent need for surgical correction. We hypothesise that the synergistic effects of multiple variants heighten the severity of CHD, particularly in cases of ventricular septal defects, thereby necessitating surgical correction. These findings significantly enhance our understanding of the unique population-specific aetiology of CHD and the basis for the severity of its clinical presentation in individuals with Down syndrome.

OPEN ACCESS

Citation: Ganguly A, Pal S, Chatterjee S, Das M, Sarkar S, Ghosh S (2025) Rare and novel variant load threshold for *KIF7*, *GJA1* and *PDE1C* genes elevates the risk of severity of congenital heart defects in Down syndrome. PLoS One 20(6): e0326566. https://doi.org/10.1371/journal.pone.0326566

Editor: Hany Mahmoud Abo-Haded, Mansoura University Faculty of Medicine, EGYPT

Received: November 15, 2024

Accepted: June 2, 2025

Published: June 26, 2025

Data availability statement: All Data files are available from the SRA public repository of NCBI, NIH, USA. Accession nos. SRR30298313, SRR30298314, SRR30298315, SRR30298316, SRR27381906.

More

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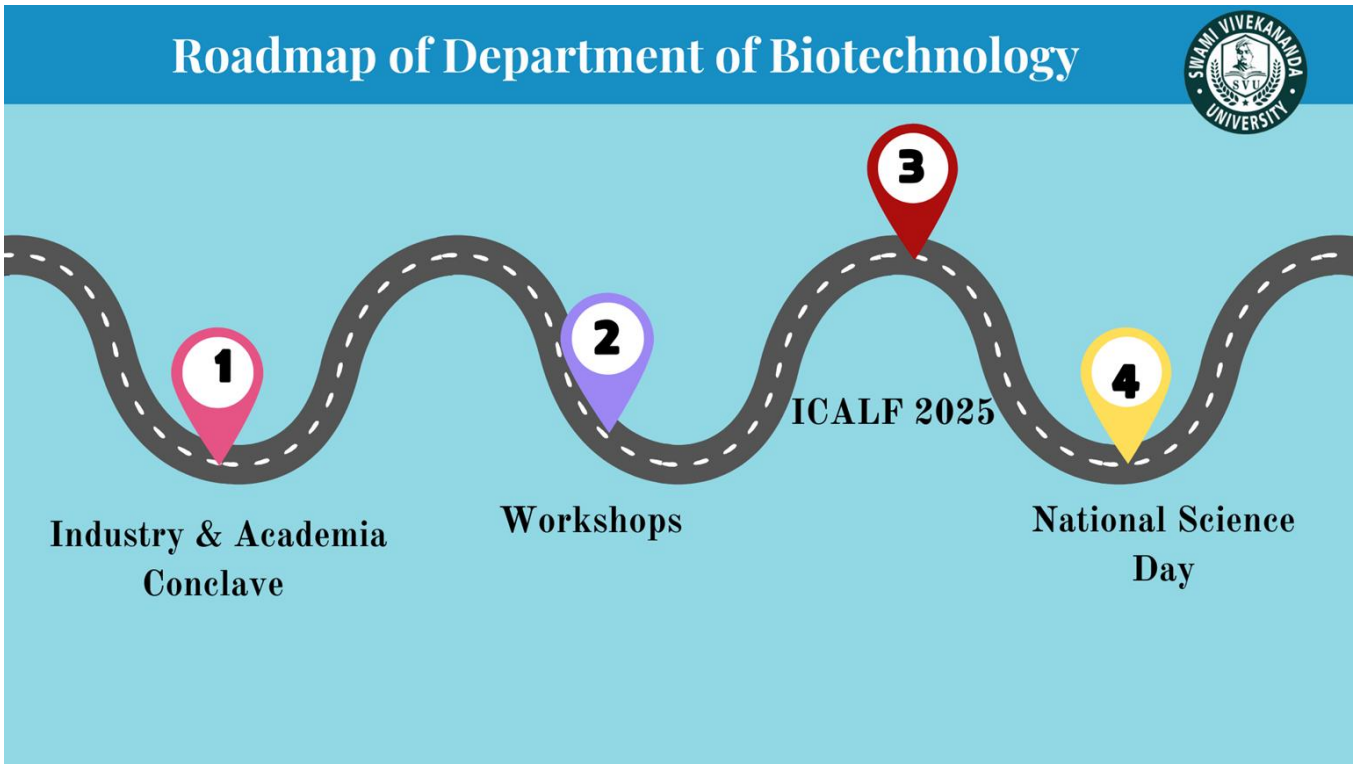
Departmental Roadmap



In the Department of Biotechnology, we are planning a series of impactful events aimed at fostering collaboration, professional development, and scientific engagement. Starting with the Industry-Academia Conclave in January, we aim to bridge the gap between academic research and industry needs, aiming student placement. Following this, we will conduct continuous training and placement workshops to enhance the skills and employability of students and young researchers. Our efforts will culminate in ICALF 2025, a major event showcasing advancements in microbiology and allied sciences, and National Science Day celebrations, designed to inspire curiosity and promote the significance of science in society. These initiatives reflect our commitment to creating opportunities for learning, innovation, and community building.

SWAMI VIVEKANANDA UNIVERSITY,
BARRACKPORE

Editorial - From HoD's Desk

Dr. Pritha Pal
Head, Department of Biotechnology
School of Life Sciences
Swami Vivekananda University

Throughout the year, the Department of Biotechnology has been actively organizing events designed to support student development. Workshops focused on continuous student skill enhancement were specifically tailored for external students from various colleges and universities, providing them with hands-on experience with scientific instruments and making a significant impact. The faculty members from the Biotechnology and Microbiology departments dedicated their efforts to organizing these sessions with great enthusiasm and commitment. The School of Life Sciences at Swami Vivekananda University has an exciting lineup of events in the coming months. In December 2024, the university will host a one-day certified workshop, "Know Your Genome," in collaboration with Inbol Healthcare Educational Centre, organized by the Departments of Microbiology and Biotechnology. Additionally, a 60-hour certified industrial training program will be offered to improve placement opportunities.