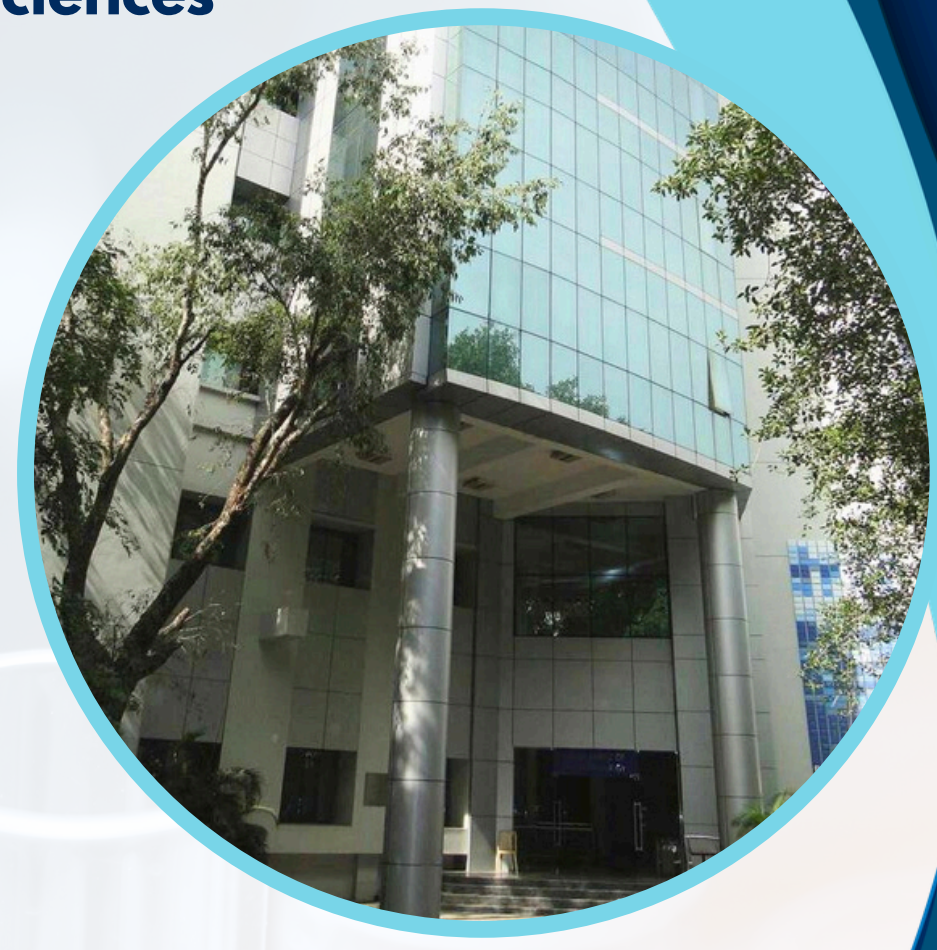
NEWSLETTER

Department of Biotechnology
Bhupat & Jyoti Mehta
School of Biosciences

ISSUE 7
(Jan-Apr 2026)



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MESSAGE FROM THE EDITORIAL DESK

We are pleased to present the seventh issue of our Departmental Newsletter. In this edition, we welcome Dr. Anushka Gupta, who joined our department as a faculty member this year. We are also thrilled to announce the launch of a new Lecture Series, graciously supported by the graduating Class of 1979; we express our sincere gratitude to our alumni for their ongoing generosity and look forward to their continued engagement. Furthermore, we are excited to announce the establishment of the Herbalife–IIT Madras Centre of Excellence on Plant Cell Fermentation Technology, spearheaded by Prof. Smita Srivastava. This issue also highlights the research journey of one of our mid-career faculty members, Dr. Arumugam Rajavelu. It also showcases the diverse research pursued within the department by featuring recent publications in biomaterials, metabolic engineering, and computational biology. It has been an exceptionally busy period for our department; we proudly participated in both the Malaviya Mission Teacher Training Programme and the institute open house, where our department secured third place for its exhibits. Finally, we capped off another successful academic year with a faculty-staff retreat. We invite you to explore this issue and welcome your feedback and suggestions as we continue to improve the newsletter.

FACULTY AWARDS

Prof. Amal Kanti Bera received the "DHR-HRD Short-Term Fellowship Abroad" award from the Ministry of Health and Family Welfare

Prof. S. Mahalingam received the Precision Med India Award 2026 for "Breakthrough Research in Breast Cancer in India".

STUDENT AWARDS

Ms. Varsha Goyal (Prof. Himanshu Sinha Lab) received the Flash Talk Award at the "*13th International Conference on Yeast Biology (IYM 2025)*" held in Bangalore.

Dr. Fathima Ridha (Prof. M. Michael Gromiha Lab) received the "*Alexander von Humboldt Research Fellowship*" to pursue research at the Max Planck Institute for Multidisciplinary Sciences, Germany.

Dr. Sumanta Das (Prof. Smita Srivastava), ANRF-National Post Doctoral Fellow, received the Best Poster Presentation certificate at the "*47th Annual Meeting of the Plant Tissue Culture Association (India)*".

Ms. Saima Owais (Prof. Kesavan Lab) received the "*JST-LOTUS Fellowship*" as an Exchange Research Fellow to pursue research at the University of Tsukuba, Japan.

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NEW FACULTY

Dr. Anushka Gupta, Assistant Professor

Areas of interest and expertise:

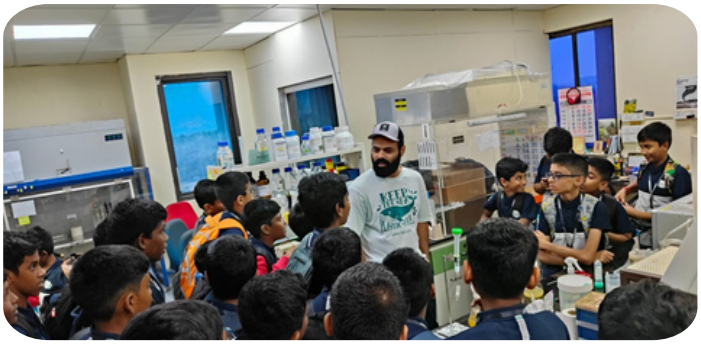
- Next-generation single-cell and spatial multi-omics assay development
- Bioinformatics method development for integrative analysis of multi-omics data
- Tumour-microenvironmental heterogeneity and its co-evolution during cancer progression
- Broad application of single-cell and spatial multi-omics in biomedical research

1979 ALUMNI LECTURE SERIES

Prof. Sharmila Bapat, former Director, NCCS Pune, delivered the inaugural lecture for the "**1979 Alumni Lecture Series**," an initiative proudly supported by the 1979 graduating class. As a prominent scientist in her field, Prof. Bapat focused her talk on her groundbreaking research aimed at uncovering the complex cellular and molecular pathways involved in ovarian cancer.

INSTITUTE OPEN HOUSE 2026

The recent Institute Open House showcased the Department of Biotechnology's significant impact through a series of engaging exhibits and interactive activities. A photo exhibit titled "BT Down Memory Lane", featuring around 75 photographs, provided visitors with insights into the department's history and evolution. A major highlight for attendees, especially school students and teachers, was the opportunity to participate in hands-on biological experiments. Popular demonstrations included ABO blood grouping, determination of sugar using Benedict's reagent, antimicrobial susceptibility testing, protein estimation using the Biuret method, DNA isolation from banana, qualitative assays for detecting coliforms in water samples, and screening for amylase production. The "Science Heroes of India" corner attracted considerable attention from younger visitors, offering engaging biology-based activities such as "Let's Build Our Cell" and a Bio quiz. The Open House witnessed enthusiastic participation, with approximately 900 visitors over two days. A total of 13 research laboratories were opened to the public, supported by 73 dedicated student volunteers. Additionally, three KV stalls-Department of Biotechnology, SynBioME, and AyushVanam-were set up as part of the event. **The Department's interactive and comprehensive showcase was recognized at the Institute level, securing the 3rd Prize in the exhibit category.**



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STUDENT RESEARCH HIGHLIGHTS

Gopinath V

Title: *Injectable antifibrotic drug-loaded hydrogels reduce fibrosis and restore myogenesis by enhancing mitochondrial metabolism and cell mechanics in an in vitro coculture model*

Authors: Gopinath V, Patel N, Chitteti R, Balakrishnan N, Panner Selvam MK, Patel HH, Lal R, Muthuvijayan V, Rajasekaran M

Journal: *Mater Today Bio*. 2026 Mar 16;38:103033.

DOI: 10.1016/j.mtbio.2026.103033

Summary

- Addresses a critical gap in how biomaterials can reduce age-related chronic low-grade inflammation-driven muscle fibrosis and atrophy.
- Developed a 2.5D immune-myogenic model using an injectable silk fibroin hydrogel to restore muscle regeneration.
- Demonstrates one of the first transcriptomic insights into hydrogel-driven regulation of mitochondrial metabolism and cell stiffness.

Title: *Integrating Sequence, Structure, and Graph-based Features for Elucidating the Stability of Thermophilic Proteins*

Authors: Ramakrishna Reddy P, Ridha F, Michael Gromiha M

Journal: *J Mol Biol.* 2026 Feb 15;438(4):169593.

DOI: doi: 10.1016/j.jmb.2025.169593

Ramakrishna Reddy P

Summary

- Identified distinct temperature-dependent stabilisation strategies across four mesophilic–thermophilic protein datasets.
- Developed a hierarchical rule-based classification method with 92% accuracy across all datasets.
- Revealed interpretable key features driving protein thermostability and enabled reliable identification of thermostable proteins.

Subasree Sridhar

Title: *Machine learning and metabolic modeling-based identification of hypoxia-driven metabolic signatures in pediatric cancer*

Authors: Sridhar S, Suraishkumar GK

Journal: *Front Pharmacol.* 2026 Apr 30;17:1810370.

DOI: 10.3389/fphar.2026.1810370

Summary

- Applied constraint-based metabolic modeling to uncover metabolic rewiring in pediatric cancers from normoxia to extreme hypoxia.
- Combined metabolic flux analysis with machine learning to interpret oxygen-dependent metabolic adaptations.
- Revealed non-linear metabolic rewiring, with ROS dominance under hypoxia and reactive sulfur species supporting redox balance in extreme hypoxia.

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RESEARCH HIGHLIGHTS

Dr. Arumugam Rajavelu

Dr. Arumugam Rajavelu is an Associate Professor in the Department of Biotechnology at IIT Madras. He completed his PhD at Jacobs University, Germany, and pursued his postdoctoral training at Stuttgart University, Germany. His lab focuses on infection biology, specifically, the epigenetic players in the malaria parasite that drive disease pathology. His recent work has revealed a potential role for the differential expression of RIFIN proteins in severe malaria. Here are excerpts of his interview.

1. What was the specific scientific 'spark' or moment of discovery during your early training that pivoted your interest toward Infection Biology, and why did you gravitate toward the specific, challenging world of malaria??

I had the enthusiasm to conduct high-quality research work and to keep learning diverse subjects. To be honest, at that time, I never thought I would work on infection biology. Although I graduated with a Master's in Microbiology from the University of Madras, I worked in Biochemistry at IISc, and then I decided to pursue research in epigenetics for my PhD and postdoctoral training. Transitioning from mammalian epigenetics to infection biology epigenetics as an independent investigator was purely accidental. I wish to connect my transition with an analogy: just as epigenetic factors (environmental factors) influence cells, I strongly believe that external "epi" factors influence and shape your interests and career path. A few such "epi" factors forced me to initiate work on the epigenetics of host-pathogen interactions. Nevertheless, I am enjoying my research and taking it forward without a second thought.

2. Can you share a specific research challenge you faced, and how that struggle fundamentally reshaped your approach to studying host-pathogen interactions?

As indicated before, I did not follow up on my postdoctoral studies to initiate my research as a PI, as many early-career faculty do. It was very challenging at the beginning to obtain the relevant research materials and protocols, as well as to identify good peers. I owe it to my students, who worked very hard along with me to set up the lab, optimize the protocols, and initiate research on host-pathogen interactions, which helped us generate preliminary data to convince funding agencies to support our research.

3. What key, unresolved questions is your lab investigating in infection biology, and how do they connect to wider biomedical challenges?

One of the primary issues in malaria biology is how the parasite switches antigens to establish a chronic infection in the host. The key question our research aims to address is how epigenetic players fine-tune this antigenic switching in response to host immunity. We believe that detailed investigations into various epigenetic modulators of the malaria parasite will open new avenues for designing vaccines or therapeutic molecules against the disease.

4. As a mentor, how do you help your students navigate the frustration inherent in high-stakes research? What advice do you give them when they face the 'complexities of academia'—such as the pressure for high-impact publication versus the need for deep, methodical discovery?

This is one part I take extra care of; I try my best to interact with all PhD students every day to discuss ongoing experiments, challenges, and issues regarding sourcing research materials. Obviously, every student encounters problems from time to time, so we sit together to troubleshoot problems through experiments. I always tell them to be completely honest when reporting their experimental procedures during our discussions. I believe that identifying the root cause will resolve nearly 50% of their research problems. Moreover, I constantly motivate them because there is no guarantee of results on a daily basis. I remind them that because they are working with biological systems (living organisms), meaningful work takes time, and patience is essential. I also keep reminding them not to worry about high-impact publications while planning and conducting their experiments. If you maintain strong research questions and execute good work with genuine enthusiasm, that dedication will naturally ensure your work gets published in high-impact journals.

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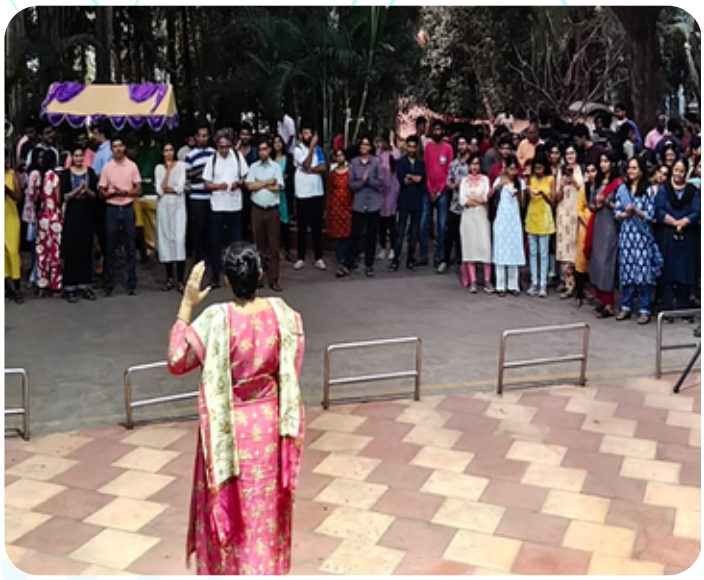
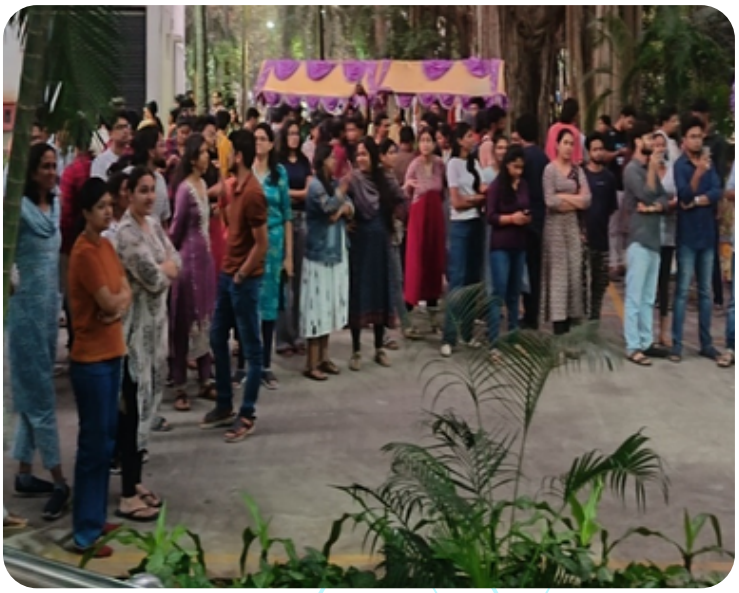
FACULTY-STAFF RETREAT 2026

The Department of Biotechnology organised a retreat for faculty and staff members, along with their families, on 28th March 2026 (Saturday). A total of approximately 72 participants, including 15 faculty members, 14 staff, and their families, took part in the retreat. The group visited Ideal Beach Resort (Mahabalipuram) for the retreat. Participants departed from the institute campus after lunch and returned late at night after a fulfilling and enjoyable day. The retreat featured a short scientific session for faculty lasting about a couple of hours, offering an opportunity for informal academic interactions and discussions. This was followed by a variety of recreational activities at the beach, where participants enthusiastically engaged in games such as tug of war, volleyball, and football. The day concluded with a dinner, bringing everyone together in a relaxed and cheerful setting. The retreat served as a refreshing break from routine, helping faculty and staff unwind, strengthen bonds, and enjoy quality time with colleagues and their families.

DEPARTMENTAL GATHERING





MEDIA OUTREACH

Herbalife India and IIT Madras have partnered to establish the Herbalife–IIT Madras Centre of Excellence on Plant Cell Fermentation Technology at IIT Madras Research Park, marking India's first dedicated facility for translational research in plant cell-based fermentation. Funded through Herbalife India's CSR initiative, the CoE, headed by Prof. Smita Srivastava, will focus on sustainable production of herbal biomass, enriched extracts, and high-value phytochemicals. Expected to begin operations in June 2026, the initiative aims to strengthen India's capabilities in sustainable bio-manufacturing and reduce dependence on imported plant-derived healthcare technologies.

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MALVIYA MISSION TEACHER TRAINING PROGRAMME 2026

The Department of Biotechnology organised an 8-day event from 2nd to 10th March as part of the Malaviya Mission Teacher Training Programme launched by the Ministry of Education. The Teaching Learning Centre at IIT, Madras, coordinated the program under the guidance of Prof. Sanjib Senapati and Dr. Mamata Bangera, with support from department staff, Ms. Lakshmi, Mr. Vengadeshkumar V., Mr. Nishanth, and Ms. Sharon. 30 faculty members from different parts of the country enthusiastically participated in the sessions. A wide range of topics, including bio-pedagogy, technical sessions in biology, entrepreneurship and funding strategies in life sciences, was covered in the program. The training modules included theory, practical, and mini-workshop sessions. The participants were given a tour of the infrastructural facilities in the department, and they got an opportunity to interact with faculty and research staff in these facilities. A visit to the IIT-M Research Park, coordinated by the Research Park team, helped provide insights into the vibrant academia-industry connection in the institute.

VISITS BY DISTINGUISHED SCIENTISTS

- Dr. Soundhara Rajan Gopi, University of Zürich, Switzerland
- Dr. Sudip Kundu, University of Calcutta
- Dr. Ellora Sen, National Brain Research Centre
- Dr. Vijay Rangachari University of Southern Mississippi, USA

HIGHLIGHTS

24	8/5	8	5	1716.30 lakhs
Publications	Patents Applied/Granted	Consultancy projects	Sponsored Projects	Grant Amount