



NEWSLETTER

**Department of Biotechnology
Bhupat & Jyoti Mehta
School of Biosciences**

**ISSUE 4
(Jan-Apr 2025)**



Visit Our Website
<https://biotech.iitm.ac.in/>



**Department of Biotechnology
Bhupat and Jyoti Mehta School of Biosciences
Indian Institute of Technology Madras,
Chennai 600036, India.**

Follow us



MESSAGE FROM THE EDITORIAL DESK >>>>>

We are pleased to present the fourth issue of our departmental newsletter. This edition is especially significant as we announce the upcoming Pan IIT Meeting on December 4-6 and Alumni Reunion on December 6, marking the Department's 20th anniversary—a milestone we look forward to celebrating with our alumni. Further, we highlight our faculty's involvement in the prestigious GenomeIndia project, showcasing their contributions to this initiative of national significance. We also report the key outcomes from the recent Department's Research Advisory Committee meeting, reflecting on ongoing research and plans for the future. This issue features a special interview highlighting the research journey of Prof. Guhan Jayaraman, one of our senior and founding faculty members. Next, we highlight an exciting industrial collaboration led by Prof. Smita Srivastava, which has resulted in the establishment of the Herbalife-IITM Plant Cell Fermentation Technology Lab. Finally, we are proud to report our department's award-winning exhibition at the recent Institute Open House, where the exhibits were especially well-received by schoolchildren and educators. We invite you to explore this issue and hope to see you at this year's reunion.

STAFF UPSKILLING >>>>>



Ms. Sasirekha participated in the EMBO Practical Course: Quantitative Proteomics – Strategies and Tools to Probe Biology held in Heidelberg, Germany.

STUDENT AWARDS >>>>>

Fathima Ridha (Prof. M. Michael Gromiha Lab) received the Best Flash Talk Award and the Poster Prize Award (RSC Chemical Biology) at the *Horizons in Structural and Computational Biology (HSCB 2025)* conference, held at IIT Hyderabad. She is also a recipient of the Institute Research Award.



Shrishti Kumari (Dr. Madaboosi Narayanan/Prof. Guhan Jayaraman Lab) received the second prize for her poster presentation at the *International Conference on Frontiers in Advanced Biofabrication and Translational Engineering*, held at IIT Madras.

Shivam Singh (Prof. Nitish Mahapatra Lab) received the Best Poster Presentation award at the *VESICON 2025* held at Mahindra University, Hyderabad, and *ISHR 2025* held at IIT Madras.



Dr. Poovitha (Prof. Nitish Mahapatra Lab) received the Naranjan S Dhalla Best Poster prize at the *Annual Conference of the International Academy of Cardiovascular Sciences (IACS)* held in Ahmedabad.

Department of Biotechnology



Anand Kumar Patel (Prof. Nitish Mahapatra Lab) received the Graduate Student Travel Award for attending the *Annual Meeting of the American Society of Biochemistry and Molecular Biology*, held in Chicago, U.S.A.

Pratyay Sengupta (Prof. Karthik Raman Lab) received the award for Best Selected Talk at the 35th edition of the *Microbiome Virtual International Forum (MVIF.35)*.



Lavanya Rajaraam (Prof. Karthik Raman Lab) received the Best Poster Award at the 35th *IBSE International Symposium: Microbiomes: Exploring Invisible Frontiers in Health, Habitat, Space, and Beyond*.

V. Janani (Prof. Nitish Mahapatra Lab) received the Best Poster Presentation award at the *Annual Conference of the International Society for Heart Research* held at IIT Madras.



Aishwarya Murali (Prof. Himanshu Sinha Lab), Indra Priyadarshini (Dr. Shantanu Pradhan Lab), Surya and Kala (Prof. Guhan Jayaraman Lab) received the *Women Leading IITM Award* from IIT Madras.

Dhanya (Prof. Nitish Mahapatra Lab) received the N.K. Ganguly Best Poster Presentation Prize at the *Annual Conference of the International Academy of Cardiovascular Sciences (IACS)* held in Ahmedabad.



DEPARTMENT ADVISORY COMMITTEE MEETING >>>>>

Our Department hosted its 2025 Advisory Committee Meeting on March 28th to 29th, 2025. The esteemed committee was chaired by Prof. Sandhya S. Visweswariah (IISc Bengaluru) and included Prof. Sandeep Verma (IIT Kanpur), Prof. Kumaravel Somasundaram (IISc Bengaluru), Prof. Upinder Bhalla (NCBS Bengaluru), Mr. Shrikumar Suryanarayan (Sea6 Energy), and Prof. Abhay Pandit (University of Galway, Ireland), who participated virtually.

The two-day event began with an overview of the Department's research, outreach, and translational efforts, presented by Prof. Sanjib Senapati, the Head of the Department. Following this, 14 faculty members showcased key aspects of their diverse research endeavors through presentations. The Advisory Committee engaged actively with the presenters, contributing insightful discussions and questions.

On the second day, the committee toured the Department's facilities, including the newly established Animal House. The meeting concluded with an engaging interaction between the Committee members and students, fostering a vibrant exchange of ideas.

STUDENT RESEARCH HIGHLIGHTS >>>>>

Title: *A Simple Magnetic-Aided Microfluidic Screening Approach for Rabies Virus via Rolling Circle Amplification*

Authors: Kumari S, Kumar M, Ramesh S, Gopal S, Khan I, Nazeer Y, Jayaraman G, Manoharan P, Sai VVR, Madaboosi N

Journal: *Microchemical Journal* 208: 112345 (2025)

DOI: <https://doi.org/10.1016/j.microc.2024.112345>



Shrishti Kumari

Summary

- Demonstrate a simple magnetic-assisted microfluidic design for highly specific and sensitive “yes-or-no” screening of rabies virus using RCA.
- The approach is scalable and compatible to be deployed in resource-limited settings with minimal infrastructure settings and extendable to other pathogen diagnosis.



Sowmya R K

Title: *DRLiPS: a novel method for prediction of druggable RNA-small molecule binding pockets using machine learning*

Authors: Krishnan SR, Roy A, Wong L, Gromiha MM

Journal: *Nucleic Acids Research* 53: gkaf239 (2025)

DOI: <https://doi.org/10.1093/nar/gkaf239>

Summary

- RNAs are currently considered as viable alternative therapeutic targets to proteins due to their complex three-dimensional structure and versatile cellular functions.
- Developed a method for predicting druggable binding sites in RNA structures with high accuracy.
- Developed a user-friendly web server available at <https://web.iitm.ac.in/bioinfo2/DRLiPS/>.

Title: *Asymmetries in the Architecture of ON and OFF Arbors in ON-OFF Direction-Selective Ganglion Cells*

Authors: Philip SA*, Singh NP*, Viswanathan S, Parida P, Sethuramanujam S

Journal: *Journal of Comparative Neurology* 533(1): e70023 (2025).

DOI: <https://doi.org/10.1002/cne.70023>



SA Philip



NP Singh

Summary

- ON-OFF direction-selective ganglion cells help the brain process the direction of a moving object.
- In this circuit, direction selectivity is independently computed by ON and OFF pathways, but the advantage of recombining both signals is not fully understood.
- The ON-OFF DSGCs amplify the synaptic drive of the OFF pathway, potentially enabling them to encode information distinct from the ON pathway.

RESEARCH HIGHLIGHTS >>>>>

Prof. Guhan Jayaraman is an expert in bioprocess engineering. His research spans the fields of metabolic engineering, synthetic biology, and bioprocess development, with a strong focus on microbial production of value-added chemicals and recombinant proteins. Prof. Guhan Jayaraman was a founding member and the first head of the BT Department. He has also been instrumental in setting up the BIRAC-funded Bioincubator at IITM Research Park. More recently, he led the establishment of a BIRAC-funded Biofoundry focused on developing a robust platform for engineering microbial strains and cell lines to produce both novel and existing products. Here are excerpts of his interview.



Prof. Guhan Jayaraman

1. What sparked your interest in your field of bioprocess engineering?

When I was an undergraduate in the early 1980s, the first recombinant therapeutic (insulin) was launched, marking the beginning of modern biotechnology. For many of us chemical engineers, this was an exciting new frontier, combining biology and chemical engineering.

2. What was the most challenging period in your research journey, and how did you overcome it?

The most challenging period was the first 8-10 years after my PhD, when my research was almost non-existent. I had joined the Centre for Biotechnology at Anna University as a Visiting Faculty (and as Asst Prof. a couple of years later) and, for various reasons that I don't want to detail, my efforts at setting up a lab and a research group were repeatedly scuttled. So, I moved to IITM (in Chemical Engg. Dept), which, however, had non-existent experimental facilities in biotech. There wasn't even a laminar flow hood or a shaker in the biochemical engineering lab. There wasn't any seed funding from the Institute (only enough to buy a PC). Fortunately, the plan to start a Biotechnology Dept very soon after I joined the ChE Dept proved to be a big boon. But it still took a lot of time to set up a lab, procure funds (a lot of that initially came from my industrial consultancy), pivot to a completely new area of research (metabolic engineering), and build a research group. From there to my current stage is a much longer story, maybe for another day. But what helped me overcome these challenges was luck, my self-belief, tenacity, willingness to explore new areas (even if they were unfamiliar), and most importantly, a wonderful group of students who were with me every step of the way.

3. What advice would you give to young faculty starting their independent research career?

Carve out your own path, enjoy what you do, don't emphasize too much on quantitative metrics, and, most importantly, do not compare yourself with others. Each of us has our own unique challenges in our field, in the research problems we choose to investigate, in the funding and students we can get. Our research productivity is circumscribed by these challenges. That said, it is important to publish in good journals and have our output defined by the quality of our publications rather than quantity. Also, while it is important to do good research and publish well, we cannot cultivate a one-dimensional mindset that research alone is the first and end goal of our career - at least not in a place like IIT.

4. Looking back, what would you consider your proudest achievement or contribution to your field?

My proudest achievement is my journey - having come this far despite a lot of odds stacked against me at the beginning of my career, the multiple setbacks, and the temporary loss of self-belief that I had to overcome. In terms of my own research, I think the technology that we have developed for producing controlled-molecular-weight hyaluronic acid is drawing a lot of interest and is in the process of tech-transfer to a couple of start-ups. Some of the best research is happening now, yet to be published. Setting up the Bioincubator in the IITM Research Park gave me a lot of satisfaction. Hopefully, the Biofoundry would too. But my greatest satisfaction has been in seeing our Dept grow, having been with it since its inception.



ANNOUNCING PAN IIT 2025, ALUMNI REUNION & 20TH ANNIVERSARY CELEBRATION

The Department of Biotechnology at IIT Madras is thrilled to announce its upcoming conference, **PAN IIT 2025**, a platform for insightful discussions, knowledge sharing, and networking within the area of biological sciences & engineering. Also, join us for the 20th Anniversary Alumni Reunion — a celebration of science, connection, and cherished memories. We warmly invite all alumni to participate in the conference, the reunion, or both!



[Click here for more details](#)



PUBLICATION HIGHLIGHTS



Mapping genetic diversity with the GenomeIndia project

Nat Genet 57, 767–773 (2025).

<https://doi.org/10.1038/s41588-025-02153-x>

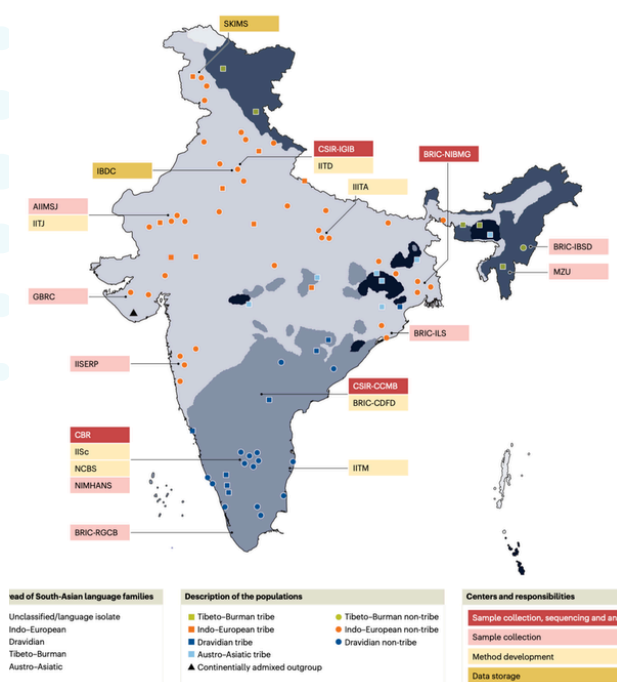


Prof. Himanshu Sinha

The **GenomeIndia** project, launched in January 2020, represents India's largest effort to document the genetic diversity of its population. This national consortium of 20 institutions, including IIT Madras (**Prof. Himanshu Sinha**, **Prof. Karthik Raman**, **Prof. Manikandan Narayanan**), has sequenced the whole genomes of 9,772 individuals from 83 population groups across India, capturing the country's rich ethnolinguistic and sociocultural diversity.

The sampling strategy balanced representation across India's four major language families (Indo-European, Dravidian, Austro-Asiatic, and Tibeto-Burman) and included both tribal and non-tribal populations.

Preliminary findings have revealed around 130 million autosomal variants, with 65% classified as ultra-rare. This information will aid in developing better diagnostic tools for genetic diseases, enhancing drug response predictions, and advancing precision medicine in India. The project also aims to create a genotype array specifically for Indian ancestry, addressing the existing Eurocentric bias in genomic databases.



INDUSTRY PARTNERSHIP >>>>>



IIT Madras & Herbalife India join hands for Sustainable Innovation!

IIT Madras has signed an agreement with **Herbalife India** to establish the Herbalife-IITM Plant Cell Fermentation Technology Lab in collaboration with Prof. Smita Srivastava. This partnership will result in the creation of a pilot-scale facility for plant cell fermentation, which will be the first dedicated facility of its kind aimed at producing high-quality herbal products at scale. This state-of-the-art facility will emphasise the sustainable production of herbal raw materials using plant cell fermentation technology, ensuring the availability of high-quality phytochemicals. The lab will serve as a catalyst for innovation in nutraceuticals, cosmeceuticals, and Ayush formulations, and will also aid in capacity building and industry collaboration in the wellness sector. Additionally, it will make a direct contribution to the UN Sustainable Development Goals (SDG3 - Good Health and Well-Being).



INSTITUTE OPEN HOUSE >>>>>

The recent **Institute Open House** showcased the BT Department's significant impact through a series of engaging exhibits and interactive activities. A photo exhibit titled "BT - Down Memory Lane," featuring around 75 photographs, offered visitors insight into the department's history and evolution. The highlight for many attendees, especially school children and teachers, was the chance to participate in exclusive hands-on bio experiments, with popular demonstrations like blood group testing and alginate bead formation. The "Doing science is fun" corner became a major draw for younger guests, offering bio-related games such as genetic matching, colour fluids, and scientist puzzles. The Open House saw enthusiastic participation, with approximately 3,000 visitors. A total of 33 research labs opened their doors to the public, aided by the dedicated efforts of 73 student volunteers. The BT Department's interactive and comprehensive science showcase was also honoured at the Institute level by winning 3rd prize in the exhibit category.



SYMPOSIUM/CONFERENCE >>>>>

The **Regional Young Investigators' Meeting (RYIM)** in Chennai, a three-day event centered on the theme "Future of Medicine and Allied Health Sciences," took place from January 22nd to 24th, 2025, at the TTJ Auditorium, IIT Madras, in collaboration with IndiaBioscience. Co-organised by Dr. Greeshma Thrivikraman, the event brought together more than 150 researchers, postdocs, industry professionals, and academics for three days of engaging discussions and valuable networking opportunities. The meeting commenced with an inaugural address by Dr. M. Srinivas, Director, AIIMS, New Delhi, and Dr. Soumya Swaminathan, Chairperson, MSSRF. The conference program focused on four key pillars: emerging technologies in healthcare, public health and sustainability, entrepreneurship, and career development.



The **5th IBSE International Symposium** was held at IIT Madras from February 19th to 21st, 2025. The symposium was organized by the Centre for Integrative and Systems Medicine (IBSE) and hosted 150 participants and 22 speakers from multiple countries. The symposium included talks, poster sessions, flash talks, a concert, a cultural excursion to Dakshin Chitra, and a tour of the IITM Research Park. The sessions covered a wide range of topics related to microbiomes, including their role in health, habitat, space, and the environment. The talks provided in-depth discussions on the latest research and advancements in microbiome studies, while the poster sessions offered a platform for researchers to present their work and engage in detailed discussions. The flash talks added a dynamic element to the symposium, allowing for quick and engaging presentations on a variety of focused topics.



HIGHLIGHTS >>>>>

36



Publications

6



**Patents
Applied/Granted**

5



**Consultancy
projects**

8



**Sponsored
Projects**

7260.5
lakhs



**Grant
Amount**

DEPARTMENTAL GATHERING >>>>>



Once a month, our department hosts “Happy Hour” event for the undergraduate students, research scholars, staff, and faculty colleagues to come together for a fun-filled evening.

VISITS BY DISTINGUISHED SCIENTISTS >>>>>

- Prof. Dmitrij Frishman, Technical University of Munich, Germany
- Prof. Kumar Somasundaram, IISc, Bengaluru
- Prof. Minhaj Sirajuddin, BRIC-inStem, Bangalore
- Dr. Prince Tiwari, IIT Roorkee
- Prof. Michael Gelinsky, TUD Dresden University of Technology, Germany
- Prof. Maneesha S. Inamdar, inStem, Bengaluru
- Prof. Shailja Singh, JNU, New Delhi

MEDIA OUTREACH >>>>>



Prof. Himanshu Sinha and his team at IBSE are using Large Language Models (LLMs) and multilingual AI to transform healthcare in India by enabling diagnostics and telemedicine in multiple Indian languages, bridging gaps in rural and underserved areas. Collaborations like IIT Madras’ CeRAI and AI4Bharat are advancing ethical, accessible, and culturally sensitive AI-driven healthcare solutions.

<https://www.healthcareexecutive.in/blog/multilingual-ai-for-diagnostics>

Newsletter Committee:

Prof. M. Michael Gromiha, Prof. Himanshu Sinha, Prof. Greeshma Thrivikraman, Prof. Santhosh Sethuramanujam & Mr. Amit Phogat