Journey of a Young Investigator

2025

IndiaBioscience

This collection celebrates the journeys of the Young Investigators who attended the Young Investigators' Meeting (YIM) in March 2025 in Agra, Uttar Pradesh. Coming from diverse backgrounds and pursuing a wide range of research interests, these researchers are united by their passion for science. We hope their stories of becoming YIs inspire other young researchers in India, and those aspiring to begin their scientific careers here.

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Foreword

When I was invited to write the foreword for *Journey of a Young Investigator 2025*, I was instantly taken down the memory lane to the time when this idea was first conceived and the vision that shaped it. IndiaBioscience has long served as a vibrant platform to foster mentoring of and networking between the young torchbearers of biological sciences in India. Over the years, every conversation that IndiaBioscience initiated—whether small or big, virtual or physical, in print or in person—has enriched its fellows and followers. The *Journey of a Young Investigator (JOYI)* emerged as another powerful means of carrying this legacy forward. I have always believed that shared experiences are one of the strongest means of learning and growing.

As I went through the narratives in this years' compendium, I was impressed with the uniqueness that gives the true strength to each story. I also appreciate the immense courage and confidence shown by each writer in opening up one's personal journey for others to learn from and draw inspiration. It is this personal angle penned by the writers that has made each of these stories so powerful and impactful.

The role of social interactions, from supporting families who nurtured curiosity in childhood and encouraged young minds to explore uncharted territories, to the friends and networks who stood by and offered support along the way in shaping meaningful scientific careers is quite palpable in each story. This spirit of collective growth and encouragement is also what makes IndiaBioscience to stand tall.

Foreword

The stories, some quite unconventional, highlight the struggles and hardships encountered along the way—be it finding the right job, lack of international experience or funding, switching fields, administrative hurdles, or the constant balancing of diverse responsibilities. Yet, it's the persistence and planning in each case that provided the right impetus in achieving the personal and professional milestones. What also stands out quite evidently is the unwavering passion for research, the drive to create impact, and the satisfaction of mentoring young minds. These common forces keep each of these researchers move forward as they carve out their own unique paths.

My best wishes and deepest appreciation to each Young Investigator (YI) for sharing their stories with fellow colleagues and with other aspiring researchers. I am certain that the experiences shared through these stories will make the reader appreciate the diverse facets of YI's journey and to draw inspiration therefrom.

Best wishes,

Smita Jain

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Adapting to the rhythms of research, mentoring, and parenthood

Sudipta Tung

Sudipta Tung from the Department of Biology at Ashoka University writes about how early research interactions shaped his scientific interests and the trials and tribulations of establishing and running a Drosophila evolution lab.

My journey as a scientist began with daily interactions with my father, a natural teacher who effortlessly transformed routine moments into learning opportunities. With him, learning was never about memorising facts; it was about questioning, connecting, and imagining beyond what was known. Today, as a mentor at Ashoka University, I try to instil that same spirit of curiosity in my students.

Choosing science

After finishing high school in 2007, I faced a pivotal choice: pursue chemical engineering at Jadavpur University, Kolkata, mining engineering at the Indian Institute of Technology (BHU) Varanasi, or join a fledgling science programme at the Indian Institute of Science Education and Research Kolkata (IISER Kolkata). Driven by my love for physics, admiration for pioneering scientists, and the financial stability provided by a monthly stipend, I chose IISER Kolkata.

In my early years, however, biology captivated me. While IISER had exceptional physics faculty, it was the curiosity-driven, hands-on laboratory sessions in biology, led by Srimonti Sarkar, N.G. Prasad, Tridib Ganguly, and Tapas Kumar Sengupta, that changed my perspective. The emphasis was on experimentation and inquiry rather than rote memorisation.

In 2008, I was selected for the Project-Oriented Biological Education (POBE) programme at the Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR), Bengaluru, where I was mentored by Amitabh Joshi and the late Vijay Kumar Sharma. This experience redefined how I saw biology — it was about understanding patterns and principles in nature, and research was about enjoying the process of discovering them. From then on, biology became my major discipline. During one summer at JNCASR, while working on a project modelling fruit fly population dynamics, I met my future PhD advisor, Sutirth Dey from IISER Pune. This encounter transformed into a two-year internship, even before I formally began my PhD.

Evolution in action: PhD and postdoc years

What began as a summer project soon grew into a decade-long dialogue on evolution and population ecology. Having already worked with my PhD supervisor, I was able to bypass the usual adjustment period. This momentum led to a few early publications and created room to take on a more ambitious project — studying dispersal evolution in *Drosophila melanogaster*.

Along with Abhishek Mishra, an alumnus of IISER Pune, I designed an experiment to track how fruit flies evolved greater dispersal ability over generations. Our findings revealed an intricate link between dispersal and metabolic evolution, setting the stage for my continued exploration into how organisms adapt to dynamic dietary environments.

I saw my postdoctoral years as an opportunity to learn something completely new. In 2019, I joined Michael Desai's lab at Harvard University through the B4 postdoctoral fellowship [Building Bharat-Boston Biosciences (B4) fellowship], moving from *Drosophila* to *Saccharomyces cerevisiae* (yeast). The short generation time of yeast allowed us to observe evolutionary changes at an unprecedented scale. This transition was intellectually enriching and expanded the scope of questions I could ask experimentally.

Around this time, I also received the DBT/Wellcome Trust India Alliance Early Career Fellowship (IA ECF). By January 2021, I was back in India, ready to establish my research group at Ashoka University—the Integrative Genetics and Evolution Laboratory (IGEL).

Building a lab from scratch: Challenges, triumphs, and lessons

"A major focus while setting up a lab is logistics — securing lab space, navigating purchases, and ensuring smooth daily operations. Initially, I shared Ashoka's insect facility, but eventually, I established a fully-equipped, dedicated fly room. This transformation required patience (plenty of deep breaths) and creative problem-solving".

A humble beginning: Fly cages, incubators and bottles with handmade cotton plugs. Photo Credit: Sudipta Tung

The COVID-19 pandemic slowed equipment procurement and threatened *Drosophila* populations, which require consistent care. Technical assistants, Nishant Kumar and Chand, played a crucial role in sustaining our fly populations.

At the same time, we launched the *Drosophila* Ecology Evolution Supergroup, a virtual seminar platform that connected fly labs across India. This network helped us troubleshoot challenges and strengthen research collaborations.

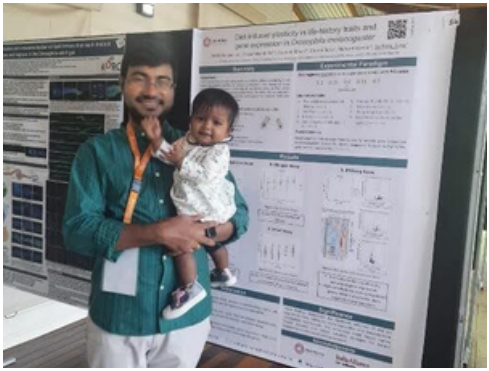
In 2021, I was honoured with the Indian National Science Academy (INSA) Young Scientist Award, which helped attract talented students. I prioritised dedication and compatibility over subject-specific expertise during PhD and Junior Research Fellow (JRF) recruitment. Now, my team includes PhD students Chandrakanth, Devashish, and Chetan, who investigate how diet influences energy use, life-history traits, and evolutionary success in model organisms like *Drosophila* by integrating experimental evolution, metabolic profiling, and gene expression analyses.

A lab lunch. Clockwise from left – Chand, Sudipta, Chetan, Chandrakanth, Ruchitha, Devashish and Nishant. Photo Credit: Sudipta Tung

"Classroom teaching has been a natural extension of my research journey. I focus on empowering students to think critically and apply real-world problem-solving skills. By fostering open-ended inquiry and hands-on exploration — much like my father's tutelage — I aim to make complex concepts intuitive. Over the past four years, I have designed and taught more than ten courses, an approach that has resonated well with students".

Parenthood: Navigating life transitions

Just as I was settling in, life presented a new challenge and opportunity. In late 2022, my wife Selva and I welcomed our daughter, Nitu. It was a joyous milestone that required me to step away from the lab physically for some time. Selva, whom I had met during our PhD days in the same lab, understood the delicate balance between a research career and parenthood. During her final trimester, my lab established clear protocols and delegated responsibilities, ensuring continuity and mutual support during my temporary absence by adapting to remote collaboration. I remain deeply grateful to my lab for keeping our research thriving even as our family grew.



Sudipta presenting a poster at the 6th Asia Pacific Drosophila Research Conference (APDRC) in Cairns, Australia with his daughter. Photo Credit: Sudipta Tung

Looking ahead: Career transitions in Indian academia

IGEL has made significant strides in a short time, thanks to the collective efforts of our team, the enabling leadership at Ashoka, and the unwavering support of my family. Two of my first PhD students have cleared their qualifying exams, and we have trained numerous undergraduate and master's students along the way. Together, we have consistently submitted research papers and presented our work at national and international conferences, where students have been recognised through travel grants and poster awards.

Yet, as my IA ECF fellowship nears its end, I face an uncertain transition since my role has not yet evolved into a regular faculty position. This reflects a broader challenge in Indian academia — the absence of clear pathways and explicit expectations for young investigators transitioning into stable roles. I hope that in the coming years, institutional leaders will establish more robust structures to support young faculty and early-career researchers.

The article is edited by Yousuf Khan, former intern at IndiaBioscience, and Moumita Mazumdar, Program Manager — Science Communication at IndiaBioscience.

Decoding plant stress: The quest to establish a metabolomics laboratory

Sharon Dsouza

Sharon D'souza is an Assistant Professor at the Department of Biotechnology, SVKM's Mithibai College, Mumbai. In this article, she writes about her interest in plant metabolomics, her decision to switch fields for her PhD, and shares some tips for running a lab with resourcefulness.

The seeds of scientific curiosity

Visualise this: Plants thriving amidst heavy traffic, growing in barren deserts, and enduring harsh and arid climates. This is what ignites my scientific passion — the ability of plants to survive and adapt to extreme conditions fascinates me, and that is what drew me into metabolomics. This set of tools and techniques helps me understand the underlying molecular and biochemical processes that help plants respond to environmental stress.

My focus is studying the metabolic make up of phytoremediated plants, while also exploring possibilities for their reuse. Currently, my team of undergraduate and postgraduate students is investigating the potential of these plants for dye degradation. Investigating plant-inducible genes, analysing phytochemicals, and assessing bioactivity in a resource-limited, foundational setup offers intriguing challenges and learning opportunities. Furthermore, navigating the diverse responsibilities of an academic career, which includes assessments, paperwork, and administrative duties, provides valuable opportunities for growth and skill development.

"Yet, my research remains the anchor that connects me to the core of academic life. After all, research is at the heart of academia".

Sharon with her UG and PG students. Picture Credit: Shruti Garg

Early beginnings: Curiosity and the spark for research

As a child, I would collect ants and rice weevils in a syringe, puncture a small hole for air, and add a grain of rice to observe how long they could survive. Though lacking many empirical parameters, such as proper sample size or controlled variables, these early experiments sparked my fascination with biology. As an undergraduate, I worked on a project on food fortification under Anupma Harshal as part of the Jigyaasa Science Honours Programme at Kishinchand Chellaram College. Later, as a postgraduate student, I shifted my focus to environmental sciences while interning with Jagannath Rathod at the Department of Marine Biology in Karwar. My passion for plant stress research began over a decade ago when I worked as a Junior Research Fellow (JRF) on a UGC project with Suvarna Sharma at Kishinchand, where I isolated stress-inducible genes from *Aloe vera* for the production of transgenic plants. From RNA extraction to *Agrobacterium*-mediated gene transfer, I gained hands-on experience — refining techniques and standardising assays from scratch.

After spending three years as a JRF on the UGC project, I embarked on my PhD with Sagarika Damle, where my research focused on plant phytochemistry and bioactivity. Initially, adjusting to the shift from molecular biology to phytochemistry was challenging, as it involved significant procedural and conceptual differences. But this shift not only broadened my skill set but also equipped me with the tools necessary to study the biochemical makeup of plants.

"One of the most enriching aspects of my PhD journey was travelling into the forests of the Western Ghats and engaging with tribal healers or vaidyas".

Their deep knowledge of medicinal plants and their properties was both fascinating and humbling — knowledge that textbooks don't offer. Our work aimed to scientifically validate this traditional wisdom by conducting bioactivity studies and analysing the phytochemical properties of these plants. My PhD also took a turn with the arrival of my newborn, and I found myself juggling between benchwork and diaper changes. I learned one of the most important lessons of my academic career: the importance of compassion and kindness. My guide exemplified these values, supporting me through the highs and lows of this journey.

Building a research career: Challenges and growth

As a researcher at SVKM's Mithibai College, I lead a team of undergraduate and postgraduate students focused on studying the stress response in aquatic plants, such as *Pistia stratiotes* L., used for phytoremediation. SVKM's Mithibai College, the management and Department of Biotechnology have been instrumental in supporting my research and providing access to centralised instrumentation facilities with state-of-the-art equipment. The institution also offers SEED grants and research incentives, fostering an environment that encourages both young and seasoned researchers. Alongside plant stress research, I am also exploring the bioactive properties of lesser-explored ethnobotanical plants, such as *Mammea suriga* (Buch.-Ham. ex Roxb.). Kosterm. Additionally, I am training in bioinformatics to apply its tools in my research. Recently, I began exploring the field of network pharmacology with my students, investigating whether compounds identified in our LC-MS/MS (Liquid Chromatography-Tandem Mass Spectrometry) studies of stress-induced plants could potentially be used for drug discovery.

Sharon with her students at a one-day multidisciplinary National Conference on Sustainable Development, organised by SVKM's Mithibai College. Photo Credit: Muzna Shaikh

What does it take to maintain a continuous flow of research funds? The answer, as many in the field will agree, lies in publications and grants. My journey took an unexpected turn in January 2020 when I submitted my PhD thesis and began applying for postdoctoral opportunities. At the peak of the pandemic, I faced a wave of rejections. Six months passed with no offer in sight, and I turned to freelancing while simultaneously upgrading my skills through online courses in plant bioinformatics and compound analysis. Eventually, I secured a position at a publication support firm, where I gained valuable knowledge about journals, publication processes, and academic writing. Although I wasn't conducting research at the time, reading research papers and working with scientists re-energised my passion for academia. For the past three years, I have been working tirelessly to gather information and secure funding for continuing my project and ultimately establishing a metabolomics lab at my current institute, where I will continue studying plant stress responses in phytoremediated plants.

Navigating the research landscape: Resilience and adaptability

My career arc reflects an unwavering commitment to research over the past twelve years, showcasing the depth of experience and passion I have brought to every project. Conducting research in a resourceful and foundational laboratory setup, with limited access to advanced instruments or reagents, has proved to be an incredibly insightful and enriching experience. It taught me to pay attention to the most minor details, as every protocol had to be standardised and every step had to be meticulously planned.

"While I may not have postdoctoral experience, my journey has provided me with valuable lessons and the confidence to set up a lab from scratch".

My message to aspiring scientists, particularly those pursuing their PhDs in institutions with environments that foster resourcefulness, is this:

- It can be tempting to seek out more promising opportunities, but real growth comes from perseverance. Stick with it, and you will find ways to make a meaningful impact.
- The lessons you learn along the way, no matter how small, are invaluable. Whether it is mastering the basics, such as preparing a budget sheet or learning how to use pipettes, each step contributes to your overall development.
- Setbacks are growth opportunities; restart, learn and move forward.
- The best thing to do during a setback is to use the time for self-improvement by learning a new skill.
- Research keeps your mind active, but balancing work with family is key.

The article is edited by Yousuf Khan and Moumita Mazumdar

Delhi to Gandhinagar and bouncing back into research

Neeru Singh

Neeru Singh is an Assistant Professor at the Department of Biotechnology and Bioengineering, Institute of Advanced Research, Gandhinagar. She writes about her experience of establishing her own research lab and juggling academic, research, administrative, and family responsibilities in this article.

My journey as an independent investigator began at the Institute of Advanced Research (IAR), Gandhinagar. Prior to it, I worked as a Department of Science and Technology (DST) woman scientist for three years at the Department of Biological Engineering, Indian Institute of Technology, Gandhinagar (IITGN). I am really grateful to the DST for their women-oriented schemes like WISE-KIRAN so that many of us can get back to research after a career gap.

My research journey began with my PhD from the University of Delhi, after qualifying the CSIR-UGC JRF (NET) exam and the prestigious Shyama Prasad Mukherjee (SPM) fellowship for toppers of the exam. My marriage brought me to Gujarat. I recall that I was extremely nervous. The place was new, I didn't know anyone, and I was unaware of any universities or research institutes in the area; it almost felt like the end of my career. But sometimes, words can have a deep impact, and you ought to remember them, especially in moments of despair. I remembered the words of S. K. Sopory, former Vice Chancellor of Jawaharlal Nehru University, who, while awarding me the first prize at a conference, said, “No matter what, never leave science”.

Beginning as a YI: first student and fund crunch

The IAR campus is nestled in a green and serene landscape adjacent to the River Sabarmati; its tranquillity makes you feel at peace. The labs are well-equipped and on par with any institute of national repute, which was all I needed when I joined.

IAR campus (left) and cell biology lab (right). Photo Credit: Digital media marketing team, IAR

Unfortunately, just a few days later, the entire country went into lockdown due to the COVID-19 pandemic. It gave me time to take care of my 6-month-old child, but my plans to begin my research had to take a back seat until things got better. Eventually, I started visiting my lab on weekends to work on a grant application. I remember leaving my kid crying at home, and dealing with that separation anxiety was really painful. The mornings are still tough for me. As I leave for the lab, my younger son clings to me and cries, asking me not to go. Sometimes I can console him, and at other times, I have to bribe him with the promise of a new toy.

After working for three years at IITGN, I developed an interest in DNA damage repair pathways in cancer biology. I decided to focus my research on this topic, with a particular emphasis on its implications in cancer therapeutics. I got my first PhD student, Kavya Pandya, but had no funds to initiate the work. However, our hypothesis was ready and we could hardly wait. I was lucky that she never complained about the unavailability of funds or resources and actually joined me in figuring out how to get things together to begin. I remember telling her to try *in silico* testing of our hypothesis instead. At first, she was reluctant, honestly telling me that neither I nor she had any prior experience. But my first student was as tough as I was and ready to face challenges.

"For a year, we learnt computational methods through tutorials and soon proved our hypothesis in silico and got it published".

In the meantime, I submitted my first project to ICMR for funding and by 2022 was able to secure my first grant as a PI and subsequently got another grant from the Gujarat State Biotech Mission. Funding was no longer a constraint, but I realised the importance of first validating the hypothesis *in silico* and then venturing into *in vitro* or *in vivo* studies. It makes science much simpler and more predictable, and I follow this approach for every project.

Neeru Singh's team. Photo Credit: Neeru Singh

Lab expansion and new challenges

My team has grown, now comprising four ambitious and wonderful women in my lab who are pursuing their PhDs and a project staff. With this expansion comes additional responsibilities and challenges. All four of my students are different, and they understand and cope with situations differently. I had to develop a strong emotional quotient to maintain a healthy lab environment characterised by mutual understanding and support, as we stay focused on our objectives.

It also meant much work in supervising their individual project proposals, progress presentations and monthly reports. Some days start with a list of faulty equipment and coordinating their repair, and at other times, I am under a pile of bills. I need to complete both of my projects within a year and also start thinking about securing additional funding to keep the lab operational. Sometimes the 24 hours of the day are not sufficient. But we also have moments of joy and happiness as we celebrate our little achievements together. I feel my team is progressing.

"We are at the stage of publishing our data and presenting our work at various conferences. My first PhD student has completed her PhD objectives and will be submitting the thesis next month".

Striking a balance between diverse roles

I teach molecular biology, genetics, and molecular diagnosis to undergraduate and postgraduate students. I love it as I get to interact and connect with the younger generation, mentoring them, and in the process, learn something new every day. I recently received a Best Teacher Award from the Institute. It was really encouraging, and I intend to keep doing even better as I move ahead.

Neeru receiving the best teacher award from P. C. Vyas, Director, IAR.
Photo Credit: Digital media marketing team, IAR

There are administrative responsibilities as well. I am a coordinator of the DBT PG Biotechnology program and a member secretary to an institutional biosafety committee. I am also the research coordinator of the Department. It is also important to me to achieve a balance between these roles. On the personal side, my important role as a mother.

My mentors exclaim that their research is over since they are engrossed in administrative and other roles, leaving no time for family, let alone for research. Learning from their experiences, I am trying to strike a balance, and it can be overwhelming at times. So far, I have never hesitated in working on weekends beyond office hours. However, I am still learning that being in academics is not an easy journey and requires much multitasking. It requires the best of your mental and emotional abilities if you intend to progress both professionally and personally.

The article is edited by Yousuf Khan and Ankita Rathore, former Associate Director at IndiaBioscience.

Exploring frontiers as a YI in India: Lessons from across the world

Pratibha Gaur

Pratibha Gaur is an Associate Professor in the Department of Biotechnology & Microbiology at SRM University. In this article, she shares her transformative journey of working at prestigious international institutions, engaging in cultural dialogue and maintaining a healthy work-life balance.

I graduated from Banasthali Vidyapith, Rajasthan, a renowned institution focused on *Panchmukhi Shiksha*, which emphasises holistic education inspired by Indian culture and simple living. My first exposure to a vibrant academic environment was at the Indian Institute of Technology, Delhi, during a summer programme while I was pursuing my BSc (Honours) degree in Biotechnology.

My scientific curiosity deepened during my MSc dissertation at the School of Life Sciences (SLS) at Jawaharlal Nehru University (JNU), Delhi, where I developed a passion for research in biology and a genuine appreciation for life beyond academia through cultural exploration. This led to my doctoral studies in virology at ICGEB, Delhi, in collaboration with Banasthali Vidyapith, Rajasthan, and the Centers for Disease Control & Prevention (CDC), Atlanta, USA.

I gained research expertise in diverse domains of advanced biology, such as viral immunology, allergy, immunopharmacology, and inflammatory cascades. Additionally, I was enriched by experiences across the globe, from the CDC in the USA to the University of São Paulo in Brazil, the Helmholtz Centre for Infection Research (HZI) in Germany, and the Hebrew University of Jerusalem (HUJI) in Israel. Currently, I am affiliated with SRM University, Delhi-NCR, and I stay committed to expanding my knowledge and contributing to scientific advancements.

A turning point in my career path

I commenced my PhD with Sunil K. Lal in the Virology Department at the ICGEB, Delhi, focusing on the intricate dynamics of virus-host interactions. My family supported me in this academic endeavour.

"Over the years, I have often been approached by aspiring students or their parents seeking guidance about opportunities in biotechnology. It is satisfying to see some of these young women achieve significant success and establish fulfilling careers".

During my PhD, I gained extensive knowledge and skills, thanks to the unwavering support of my supervisor, seniors, and colleagues throughout this challenging yet rewarding journey. I completed a significant portion of my research with Suryaprakash Sambhara at the CDC in Atlanta.

It also brought personal challenges: I was newly married, and like many other women scientists, I found it difficult to balance a long-distance relationship with the demands of intensive research work. Many women face the expectation to prioritise family over their careers, but I was fortunate to have unwavering support from my husband & family.

Making judicious decisions

The second major challenge was the next step. While at CDC, I explored postdoctoral opportunities in the United States, engaging with several scientists in the field. My search for a postdoctoral position was significantly hindered since research articles from my PhD were yet to be published. This uncertainty underscored the importance of timing and academic publications in advancing a research career.

"A key lesson was not to rush into a postdoctoral position immediately".

In India, PhD programmes often span 4 – 6 years and involve multiple research projects and publications. It is crucial to maximise these opportunities and carefully select a postdoctoral lab that aligns with one's long-term career goals.

My husband, Abhinay Sharma, and I joined as CNPq postdoctoral fellows with Celia Garcia, a distinguished malaria researcher at the University of São Paulo, Brazil. However, adapting to life there posed challenges, particularly as a vegetarian. Personal and professional considerations had to align, as we wanted to extend the family. Considering this, we eventually moved to the HZI in Germany.

My tenure at HZI was particularly rewarding, as it resulted in my highest-impact publication to date. My research focused on viral-host interactions, particularly in metabolic syndromes such as obesity.

Pratibha and her husband's with their bundle of joy at Braunschweig, Germany, July 2015. Photo Credit: V Pawa

Balancing motherhood and a science career

I was deeply involved in two major projects on obesity with Dagmar Wirth at HZI when I received the joyous news of my pregnancy. While I was thrilled personally, I also faced a dilemma — how to balance this with my research work? Strict German regulations on pregnant women working with animals posed additional challenges. Thankfully, my supervisor, husband, and lab colleagues provided encouragement and assistance. I focused on manuscript preparation, ensuring that my research continued. I learnt valuable lessons about resilience, adaptability, and the importance of a strong support system in overcoming professional and personal challenges.

The arrival of my child began a new and challenging phase with emotional and physical adjustments, especially as a first-time mother. After much reflection, I took a step back for a year to fully embrace motherhood – these early moments with my child were irreplaceable. I acknowledge that not all mothers in science have this privilege due to varying circumstances. However, I firmly believe it is vital to carve out some time for themselves when possible.

I resumed my career, albeit with new challenges. We successfully published one article, but balancing family responsibilities and academic pursuits became more demanding. While transitioning to a new country, I submitted the second manuscript to my supervisor, maintaining the project's momentum despite the move.

"Persistence and strategic planning are essential in managing both personal and professional milestones".

To Einstein's HUJI and returning to India

Moving to Israel introduced me to an entirely different culture, both in research and personal life. I began contemplating returning to India, given the age constraints for securing academic positions. Aware that time was against me, I took on four to five projects simultaneously to make up for my career break. Despite the COVID-19 pandemic, I got a significant publication in immunopharmacology with Francesca Levi Schaffer.

Pratibha sharing an exciting result with a colleague of her at the Hebrew University of Jerusalem, Israel (HUJI), 2022. Photo Credit: Shiran

After much deliberation, I decided to return home, in part due to family circumstances. It was not easy and initially felt like a professional and personal setback. I faced difficulties in securing a position at government universities in India. I applied for positions through the Sci-ROI platform, attended interviews, and soon received an offer from GITAM University to join as an Assistant Professor.

I remained determined, balancing the demands of a new job with raising my young son. This required immense effort and resilience, but my unwavering commitment to both my family and career continued to drive me.

Establishing my research group

Soon, I joined SRM University as an Associate Professor. I established my own research group and focused on grant writing and publications to lay a strong foundation. Two master's students completed their theses under my guidance, with one moving to the USA for a PhD.

Current group members (Women in Science) at C4D, SRMUH — 2024.
Photo Credit: S Tripathi

One of my priorities was to initiate collaborations, which helped me establish my lab and begin preliminary work. I also secured a seed grant from the university. My PhD student is making good progress in her research on host-pathogen interactions. Although our group is small, we are steadily advancing, driven by determination and a shared vision for impactful science.

The article is edited by Yousuf Khan and Ankita Rathore

It takes a global village to raise a lab

Chetana Baliga

Chetana Baliga studies interventions for antimicrobial resistance at the M. S. Ramaiah University of Applied Sciences (RUAS), Bengaluru. In this article, she shares the story of a difficult postdoc to PI transition and how the support from her friends and colleagues, near and far, propelled her to success.

The dream

I always wanted to teach and do research. I grew up hearing stories about my great-grandfather, a highly respected schoolteacher, and I wanted to follow in his footsteps. While my classmates dreamt of landing lucrative medical or engineering admissions, I insisted on pursuing a career in the sciences.

During my BSc, I got the opportunity for summer internships at the Indian Veterinary Research Institute (IVRI) and the Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR), Bengaluru, which fueled my passion for research. With an MSc (Biotechnology) from the Indian Institute of Technology Bombay, Mumbai, and a PhD in Biophysics from the Molecular Biophysics Unit, Indian Institute of Science (IISc), Bengaluru, I felt I was on track towards realising my dream.

After completing my PhD, it took me a while to find the right postdoctoral position, as my spouse and I had to navigate the dreaded two-body problem. I eventually joined the Mankin-Vazquez lab at the University of Illinois at Chicago in 2019 for a postdoctoral position, where I worked on ribosome-binding peptide antibiotics.

My years as a postdoctoral research associate were absolutely wonderful. I was involved in multiple projects and was excited to see how my PhD learnings applied successfully to entirely new areas. The lab environment was very conducive to good ethical science. The group meetings, journal clubs, and department seminars fostered an open culture of inquisitiveness and asking questions. I also had the opportunity to mentor multiple summer interns and graduate students, which I found highly rewarding. I learned to modify my teaching style to match each student's aptitude.

Unfortunately, COVID-19 struck around this time. Everything came to a standstill. While the University reopened after three months, we continued to feel the effects of COVID-19 much longer – especially in the form of systemic delays that had affected all governmental processes.

Moving back to India and a recruitment drive at IISc

Due to chronic delays in immigration services and family obligations, we had to return to Bangalore earlier than expected in early 2022. My postdoctoral projects had not yet reached completion, and I had no exit plan. With a toddler and an infant in tow, job applications felt like an impossible task. Additionally, I had taken a break between my PhD and postdoctoral studies when my older child was born, placing me in the dreaded "above 35 years of age" bracket, which made it tougher to apply for academic jobs in India.

In mid-2022, IISc held a special recruitment drive for women faculty. What gave me hope was that the call did not specify an age limit. With strong encouragement from my husband, I took the plunge and applied. I had about a month to get an application ready from scratch. With no prior preparation or even a clue about the application process, I reached out to several friends.

Everyone took time out to help. They put me in touch with friends who had previously applied, interviewed, and secured faculty positions in India. COVID-19 had taught us that collaboration was possible even across miles. People I had never met took time out to advise me on budgeting and preparing a teaching statement.

“It was heartwarming that people were happy to help me, as they had previously been in the same boat, and just asked me to pay it forward".

When my application got short-listed for an interview, I was overjoyed. My PhD advisor, Raghavan Varadarajan, gave me critical inputs. My postdoctoral advisors, Alexander Mankin and Nora Vazquez-Laslop, cheered me on at each stage, convincing me that I was ready for this. They even patiently sat through a two-hour-long mock interview, going over each slide in detail and helping me perfect them.

Although I did not land the job, this application and interview process was an important step toward realising the dream I had since childhood. It helped me overcome hurdles — some real, some imagined. Additionally, it also gave me clarity on my career path and how deeply I wanted to return to academia. Most importantly, I gained several new friends in the process, one of whom pointed me towards the DBT-Ramalingaswami Re-entry Fellowship.

The DBT-Ramalingaswami Fellowship (DBT-RLS)

The DBT-Ramalingaswami Fellowship (DBT-RLS) is designed to encourage Indian scientists working abroad to move back to India. It provides a generous monthly salary and a research contingency, without rigid budget heads, which is very helpful for a young, inexperienced PI who is unable to visualise the diverse costs of running a project. It has an upper age limit of 45 years, and applicants could apply up to a year after returning to India, provided they hadn’t already secured a job.

The Antimicrobial Peptides (AMP) lab at the Department of Biotechnology, Faculty of Life and Allied Health Sciences, Ramaiah University of Applied Sciences, Bangalore, January 2025. Front row (L to R): Anjana, Suma, Varshini, Spoorthi, Neha, Chetana, Harshitha, Rakshitha, and Shreyas. Back row (L to R): Jaikumar, Srinidhi, Rushi, Pranjal, Hitha, and Srujana. Photo Credit: Renie Trisha.

I decided to apply for the fellowship and wanted to choose a host institute that provided the necessary facilities and support for my research, while also offering teaching opportunities. Once again, I reached out to several friends, and one put me in touch with the then Head of the Department of Biotechnology, Ramaiah University of Applied Sciences (RUAS), Bengaluru. I visited the Department, met the faculty, and, with their support, went ahead with applying for the DBT-RLS, with RUAS as my host institute. A few months later, I was awarded the fellowship, marking the start of my career as an independent researcher and faculty member.

Such a long journey…

It has been a long journey to achieving my childhood dream. Now, my research group works on tackling Antimicrobial Resistance (AMR), a problem of immense importance in India. Specifically, we explore diverse Antimicrobial Peptides (AMPs) as potential antibiotics, understanding their modes of action and evolving them for improved antimicrobial efficacy.

The Department of Biotechnology at RUAS is young and growing, with a vision of intertwining quality teaching with cutting-edge research, thus enabling me to finally realise my dream of being both a scientist and a teacher. My colleagues come from all over the country, with diverse research backgrounds, which encourages and promotes interdisciplinary research. Our university also encompasses the renowned Ramaiah Medical College and Hospital, enabling interactions with clinical microbiologists, which is critical for advancing my research.

"My research group consists largely of young students – both undergraduate and postgraduate, and I greatly enjoy mentoring them and teaching them the importance of doing good ethical science".

I also teach Biotechnology students at my university — both bachelor's and master's level- and it gives me immense satisfaction to be able to instil a passion for science in young minds. Of course, I face challenges that every young PI does, of learning to balance teaching and research roles. Added to that are the challenges of maintaining work-life balance as a mother of two young children. But having a supportive family, nurturing work atmosphere, and an extended network of helpful friends makes it possible to overcome these challenges, one at a time.

Although my transition from postdoc to PI wasn't smooth, the journey was highly enriching. I learned that no person is an island, and we all get by with a little help from our friends. I also realised the importance of initiatives such as special recruitment drives and re-entry fellowships, which helped me to revive lost dreams.

Our research group at the AMR conference held at Tata Institute of Genome and Society (TIGS) in August 2024. (L to R) Chetana, Hitha, Nabila and Shaib Jan. Photo Credit: Vaishnavi Naik.

The article is edited by Yousuf Khan and Moumita Mazumdar

Lab notes and sleepless nights: Balancing science and motherhood

Ankisha Vijay

Ankisha Vijay is an Assistant Professor in the Department of Biotechnology, Jaypee Institute of Information Technology (JIIT), Noida. In her piece, she narrates how she remains steadfast in her rewarding role as a mother despite the challenges of charting her path in a research career.

My research journey began during my MSc dissertation at the Indian Institute of Toxicology Research (IITR), Lucknow, where I discovered my passion for research. This motivation led me to pursue a PhD at the Indian Institute of Technology (IIT) Jodhpur in the Department of Bioscience and Bioengineering as part of its inaugural batch. I was also the first PhD student in my lab, the Environmental Biotechnology Lab, where I embarked on groundbreaking research in environmental engineering, a highly interdisciplinary field.

As a biologist venturing into a completely interdisciplinary area, the biggest challenge was adapting to a new domain. During my PhD, I developed a strong foundation in electrochemistry and material science, seamlessly integrating these disciplines with microbiology and molecular biology.

Being the first PhD student in the lab, I faced the unique challenge of setting up a research lab from scratch, including establishing new instruments, protocols, and workflows. I gained invaluable expertise in building and managing a research lab.

My work focused on the bioremediation of nitrate and uranium waste using microbial fuel cells (MFC), a project funded by the Bhabha Atomic Research Centre (BARC). We successfully developed a technology to remove uranium (VI) from nuclear waste, which was validated using real effluents from BARC, Mumbai. We developed low-cost technology to fabricate the MFC reactors and published our findings in high-impact journals.

"This experience gave me the skills and insights necessary to design and develop innovative technologies from the ground up".

Next, I joined the Indian Institute of Technology (IIT) Bombay, Mumbai, as an Institute Postdoctoral Fellow (IPDF) in the Department of Energy Science and Engineering. Transitioning to a completely different field was a challenging yet rewarding learning experience. My research focused on desalination and the material modification process in MFC, where I deepened my understanding of electrochemistry. During this tenure, I was also invited to deliver a special lecture at CSIR-IMTECH, Chandigarh, which significantly boosted my confidence. Subsequently, I joined the Environmental Science and Engineering Department at IIT Bombay as a research scientist on an industrial project with HPCL and IOCL, focusing on the nitrification and denitrification of refinery wastewater.

Turning point

During my postdoctoral tenure, I actively sought permanent academic positions at esteemed institutions across India. Ultimately, I secured a permanent position as an Assistant Professor in the Department of Biotechnology at Jaypee Institute of Information Technology (JIIT), Noida. This marked the beginning of a new chapter in my life as a young faculty member and a new mother to twin daughters, Vedika and Vaanya. Motherhood was the most beautiful and fulfilling part of my life, but it also brought its own set of challenges. My daughters became my greatest inspiration, motivating me to further excel in my research journey.

At JIIT Noida, I was fortunate to have a supportive and cooperative environment within the Department of Biotechnology. The head of the department consistently encouraged me to maintain a positive outlook, even during the challenges of my pregnancy. Despite dealing with swollen feet and persistent nausea, I remained committed to teaching my classes and advancing my research.

Ankisha working in the office at JIIT Noida. Photo Credit: Pooja Choudhary

I received seed funding from the institute's Directorate of Research, Innovation and Development (DRID) programme for my project, which marked an important milestone in my journey. Following the birth of my twin daughters, I took six months of maternity leave to focus on their care, a time that was both demanding and deeply rewarding.

When I returned to work, I rejoined the department with renewed energy and a clear focus on my research. I began mentoring PhD, master's, and BTech students and had already outlined objectives and experiments to kickstart my work. My research pivoted toward bioenergy generation and wastewater treatment, a field that aligned with my expertise and vision. The training and experiences I gained during my PhD were invaluable as I navigated the challenges of establishing my research as a young PI**.** I have also collaborated with scientists worldwide to expand my research and contribute to significant studies. Additionally, I have integrated bioinformatics concepts to enhance my work.

Balancing act

Balancing the demands of raising twins and building a research career is undoubtedly challenging, but it has also become a driving force behind my dedication and resilience. Motherhood is a transformative experience, but it comes with its own set of demands, both emotional and physical. Balancing the unpredictable hours of research work, tight project deadlines, and the needs of young children requires exceptional time management and support systems.

"I found myself juggling among grant applications, mentoring students, and conducting experiments, all while navigating sleepless nights and childcare responsibilities".

After a long day at work, the moment I step home and see my kids' smiles, all my worries and stress melt away. They would eagerly wait for me each evening, rushing to hug me the moment I arrived, filling my heart with pure joy.

Amidst all these challenges, family support played a crucial role. My mother, husband, and extended families stepped in to share childcare duties, enabling me to focus on my research. However, even with a strong support network, the journey requires determination and meticulous planning.

My life revolved around sleepless nights with children, chaotic early mornings, and the unwavering determination to excel in both worlds. It is about finding joy in small milestones, whether a successful experiment or a child's first step, and learning to embrace imperfection along the way. Motherhood teaches patience, multitasking, and the ability to adapt to ever-changing situations, qualities that are equally essential in scientific research.

Ankisha with her husband and twins on their six months birthday celebration.
Photo Credit: Ankisha Vijay

The path forward

As a young scientist, establishing a laboratory is a demanding and time-intensive process that requires research funding. Recently, I was selected for the Prime Minister Early Career Research Grant from Anusandhan National Research Foundation (ANRF), which will support setting up my lab. I am in the process of setting up a lab focused on power generation, utilising algae and microbes for wastewater treatment, developing efficient electrode material for MFC, and exploring different environmental bioengineering aspects.

To truly empower women scientists in India, systemic changes are essential. Institutions must implement policies that support work-life balance, such as longer maternity leaves, accessible childcare, and mentorship programmes.

"Ultimately, doing science in India while balancing motherhood is not just a challenge; it is a testament to the strength and resilience of women who redefine what it means to succeed".

By nurturing both their scientific pursuits and their families, they contribute not only to the advancement of knowledge but also to a more inclusive and supportive research community.

Ankisha working with her students in the lab. Photo credit: Chestha Lamba

The article is edited by Yousuf Khan and Moumita Mazumdar

Origins and evolution: My interdisciplinary research journey in India

Sandeep Ameta

Sandeep Ameta is an Assistant Professor of Biology in the Trivedi School of Biosciences, Ashoka University. In this article, he shares what led him to an unconventional research track. He recalls the many challenges and triumphs that ultimately led to the founding of his 'Origin of Life' research group in India.

My research journey has been very thrilling, as I was introduced to different scientific disciplines right from the beginning. It started with my MSc degree in Biotechnology at the Indian Institute of Technology Bombay, Mumbai, where I completed my thesis on bioinformatics with P V Balaji. Simultaneously, I worked on a biochemistry-related project as a Visiting Student Research Programme student at the Department of Biological Sciences, Tata Institute of Fundamental Research, Mumbai, supervised by Shobhona Sharma.

Being an experimentalist at heart, I started to look for an experimental lab for my PhD, even though my master's thesis was in comparative genomics. Fortunately, I secured a PhD position in Andres Jäschke's Bioorganic Chemistry lab at Heidelberg University, Germany.

"Here, I was introduced to research on the Origins of Life, which significantly shaped my future career".

Like many, I too was fascinated with outer space and wished to be an astronaut, but always felt that space research was outside my area of expertise. As I began my PhD, I discovered that space research is a big umbrella that brings different disciplines together to address the many mysteries of outer space, including questions surrounding the Origins of Life. The National Aeronautics and Space Administration (NASA) was supporting a large Astrobiology programme, which included research on RNA evolution. I was on the right track!

My PhD centred on the 'RNA World' concept, which posited an era in the origins of life on Earth where RNA stored information and had catalytic functions. I concentrated on evolving RNA enzymes (called ribozymes) and *in vitro* using directed evolution methods. Additionally, I learned new skill sets, including basic chemical synthesis, chemical labelling of RNA, and peptide synthesis, which proved useful later.

Shifting gears...

Until now, I had made a relatively small shift from genomics to a bio-organic lab. My PhD had led me towards the intersection of different disciplines and Origins of Life studies. Afterwards, I moved to Paris for my postdoctoral research at ESPCI Paris, where Marie Curie discovered radioactivity and several other Nobel Laureates had worked. Though the lab focused on single-cell genomics and antibody discovery, I joined an Origin of Life project based on RNA self-replication in water-in-oil emulsions. This helped me develop a broader perspective about Origins of Life research, and at the same time, learn new skills. I analysed self-replicating RNA network dynamics and their evolutionary potential using droplet-based microfluidics and single-droplet sequencing.

One of the most intriguing things about the lab was that one of my mentors was a physicist, Philippe Nghe, and the other was a biochemist, Andrew Griffiths. This combination made me adept at approaching research problems from a quantitative perspective and combining theory with experiments. By attending symposia and brainstorming sessions, I had the chance to collaborate with other theoretical groups.

Moving back to India...

The exposure in Paris paved the path for my next career steps. While I was thinking of returning to India, it was clear that setting up an 'Origin of Life' lab in India would be a daunting challenge. At times, I was also discouraged from working on such an

A lab meeting at Simons Centre, NCBS in Bengaluru. Photo Credit: Sandeep Ameta

abstract topic, which had little translational potential, at an early stage of my career as there would be less support.

However, in the last year of my postdoc, an opportunity at the National Centre for Biological Sciences (NCBS) struck me. NCBS has a Campus Fellow programme where you bring your ideas and look for a lab to host you. In 2019, I became an independent campus fellow hosted by the Simons Centre for the Study of Living Machines at NCBS to set up work on RNA network evolution with Shashi Thutupalli (experimental lab) and Sandeep Krishna (theory lab).

Since the Thutupalli lab was working on soft-matter physics and had a strong interest in Origin of Life studies, together with Shashi and Manoj Kumar, a fellow postdoc, I analysed RNA networks inside liquid-liquid phase-separated (LLPS) droplets, a model proto-cell system. During my time at NCBS, I was captivated by these membrane-less phase-separated droplets but realised that several fundamental questions need a quantitative understanding, especially in the context of structured and functional RNAs. We further explored the dynamics of oligonucleotides inside the constrained microenvironment of LLPS droplets with Anupam Singh, a PhD student in the lab.

Thanks to NCBS and Simons Centre, the fellowship turned out to be a perfect opportunity to move back to India and pursue my Origin of Life research. At the same time, it proved useful in adapting to India's research ecosystem and applying for faculty positions.

Starting my group...

Multiple encounters over the years with various individuals, their mentorship, and exposure to different fields have opened my eyes, moulded my perspective, and equipped me to operate at the intersection of various disciplines. The next step was to start my research group. After several applications, I got a faculty position offer from Ashoka University in the Department of Biology, Trivedi School of Biosciences to set up the Functional RNA Lab.

Lab picture hand-drawn by one of the research interns. (L to R) Aritra Chakraborty (first PhD student), Srishti Sharma (research intern, first student to join the lab), Sana Hasan Jagmag (research intern who drew the picture), Faizal Khan (first JRF of the lab, now a PhD student), and Sandeep Ameta. Photo Credit: Sandeep Ameta

"I realised that they share the same excitement and passion as I have for Origins of Life research".

Ashoka has a diverse mix of researchers and experts – a vibrant environment to carry out cutting-edge research and teaching. Different disciplines are intertwined, giving an ideal atmosphere for me to address the research problems of my interest. Currently, the lab is focusing on developing synthetic chemical systems that can evolve, with an overarching goal of constructing '*life-like*' chemical systems. At the same time, we are also analysing the dynamics of functional RNAs in the complex microenvironment of LLPS droplets. In addition, as I am always excited about RNA evolution, we are also evolving novel RNAs using machine-learning algorithms.

While I have dealt with several challenges over the years, there are still many obstacles to overcome, such as obtaining adequate funding for this fundamental research programme and attracting a steady stream of students eager to immerse themselves in this fascinating but demanding work. Nonetheless, the future is bright. With the support of mentors and friends, we are constantly trying to develop a sustaining pedagogic and research programme centred around the emergence of life on Earth and other planets.

The article is edited by Yousuf Khan and Ankita Rathore

Roots, risks, and rewards: Navigating a scientific career in India

Aditya Kumar Padhi

Aditya Kumar Padhi is an Assistant Professor at the School of Biochemical Engineering, Indian Institute of Technology (BHU) Varanasi. In this article, he discusses his journey in computational biology, sharing lessons from each stage, and how he set up his lab in India after a postdoctoral tenure abroad.

Navigating a scientific career is a journey bundled with uncertainties, challenges, and moments of revelation, making it no small feat, especially when one is starting from a modest background with limited exposure to research or higher education.

My journey, rooted in resilience and passion, took me from a small-town middle-class family to leading a research group at the Indian Institute of Technology (IIT) (BHU) Varanasi.

Along the way, I have encountered challenges, savoured triumphs, and gained invaluable lessons that have not only shaped my career but also influenced my outlook on life.

The early spark that ignited curiosity

Growing up, I was surrounded by individuals unfamiliar with the world of science and academia. Yet, my fascination with biology sparked during my school years. Always backed by my father, my uncle, and supportive teachers, I decided to pursue a career in biology. Driven by my strong interest, my paternal uncle, a surgeon and medical specialist, suggested exploring paths beyond MBBS due to our family's financial constraints and the competitive nature of the medical field. Biotechnology appeared promising as it is a concoction of both biology and technology. Despite the uncertainty, I enrolled in a BTech program at a state college affiliated with the Biju Patnaik University of Technology, Odisha. However, during my undergraduate years, I quickly realised that biotechnology, unlike the booming IT sector, had limited job prospects.

"This reality, coupled with my strong fascination for biology, pushed me to look beyond traditional career paths while staying true to my love for biology and science".

The turning point: Discovering research at IIT Delhi

Recognising the challenges posed by limited infrastructure, I sought to engage with like-minded peers and attend workshops and conferences at renowned institutions. These experiences broadened my perspective, fuelling my determination to carve a niche. A pivotal moment was my six-month dissertation at IIT Delhi, made possible by the strong support of my undergraduate teacher and lifelong mentor: Shyam Kumar Masakapalli. I engaged in cutting-edge research, intense academic discussions, and a vibrant research culture.

After completing my dissertation, I joined IIT Delhi as a Junior Research Fellow on a DBT-funded project. This role was crucial for understanding computational biology and biophysics, solidifying my decision to pursue a PhD in this field. Embarking on a PhD program was a transformative experience as it was both challenging and rewarding. I delved into areas such as computational biophysics, biomolecular simulations, neurodegenerative disorders, and other multidisciplinary fields, yielding several impactful publications that combined computational predictions with experimental validation.

Collaborations with other labs enriched my research experience. I am deeply grateful to my two PhD supervisors, James Gomes and Manidipa Banerjee, and senior mentor, B. Jayaram, for their patience, guidance, and constant motivation, which helped me complete my thesis with resilience and on a high note.

"As I approached completion, though my priority was on securing a postdoctoral position, I also appeared for a few faculty interviews to gain insight into the process, an experience that proved beneficial later".

Taking a leap of faith: Broadening horizons abroad

Choosing RIKEN Yokohama, Japan, for my postdoctoral research was pivotal, albeit a challenging one. At the time, my father had just undergone a major heart surgery, and my family needed my support. Despite the personal hurdles, my family's unwavering encouragement propelled me forward. Under the guidance of my supportive advisor, Kam Zhang, I ventured into innovative areas like computational protein and enzyme design, non-natural amino acids, reverse-engineering evolution-inspired design of prototype folds, and biomolecular simulations.

Supported by fellowships from JSPS, TBRF, and Takeda Science Foundation, I published high-impact research while juggling between personal and professional challenges, including the COVID-19 pandemic and impending career deadlines. Nevertheless, perseverance, along with the unwavering support of my PhD and postdoctoral advisors, a few trusted colleagues and well-wishers, my wife, and my family, allowed me to thrive and stay committed to my goals.

Bridging biology and bytes: The LCBD team at IIT (BHU) Varanasi. Photo Credit: Shivank Kumar.

Returning home and establishing a lab in India

The final years of my postdoc were a whirlwind. With my lab at RIKEN closing and my wife returning to India as we were expecting a child, uncertainty loomed large. However, fate intervened when I received an opportunity for a faculty interview at IIT (BHU) during my visit to India. Just a week after my daughter was born, I faced the interview panel, determined to build a future for my family and career.

Joining IIT (BHU) as an Assistant Professor marked the beginning of a new chapter. I established the Laboratory for Computational Biology & Biomolecular Design (LCBD), focusing on areas like computational biology, computational protein design, structural & translational bioinformatics, antimicrobial resistance, predictive modelling, biomolecular modelling and simulations, machine learning, and disease mechanisms. Establishing a research lab in India has been a journey of perseverance. Balancing limited resources, administrative responsibilities, and high expectations requires innovation and adaptability.

"Despite these challenges, I find immense satisfaction in mentoring young minds and contributing to the Indian scientific community".

In support, IIT (BHU) Varanasi has provided me with not only a platform but also the freedom to translate my aspirations into impactful research and teaching, which is made all the more fulfilling by the students' appreciation and curiosity.

My journey so far has offered several key lessons that are worth sharing. You should surround yourself with well-wishers and mentors who can guide and motivate you during challenging times. Whether in India or abroad, a postdoctoral position offers invaluable opportunities to acquire new skills, explore innovative ideas, and expand your professional network. During your postdoc, start laying the groundwork for your academic career. Strive for a balance between publishing impactful research and articulating a clear vision for your future lab. Maintaining a positive attitude and work ethic is crucial. Challenges often teach valuable lessons, and enjoying your work makes the journey worthwhile.

"Building a lab in India comes with unique obstacles, from securing grants to managing students. Viewing these challenges as learning experiences can make the process gratifying".

Balancing science, life, and growth

As a faculty member, I have embraced a multifaceted role encompassing research, teaching young minds, and fulfilling administrative responsibilities. Beyond work, spending time with my family and engaging in editorial activities for journals such as Biochemical and Biophysical Research Communications (Elsevier) provide me with a refreshing perspective, help me learn new science, and maintain balance.

At LCBD, our research team comprises five PhD, two MTech, and seven undergraduate students, who work on broad areas of (i) fundamental and translational research and (ii) methods, pipelines, and tools development, utilising integrated computational and experimental approaches. The journey so far has been marked by teamwork, passion, and unwavering support from my family and mentors, reflecting the possibilities for aspiring scientists in India. With dedication and a vision, one can overcome hurdles and contribute meaningfully to science.

As I move forward, I remain deeply committed to mentoring the next generation of researchers and advancing knowledge in broad areas of computational biology. This is not just my career—it's a lifelong passion. Passion and resilience can turn challenges into opportunities. Trust the process, believe in your mentors, and embrace the journey with an open mind and a positive attitude.

The article is edited by Yousuf Khan and Ankita Rathore

Rural roots to scientific success in Indian academia

Shankramma Kalikeri

Shankramma K is an Assistant Professor at the JSS Academy of Higher Education and Research (Deemed to be University), Mysuru. In her article, she shares her journey of overcoming adversity, pursuing higher education against all odds, and using her expertise in nanotechnology to make a meaningful impact on rural communities through science and innovation.

I grew up in a small, backward and remote village in the state of Karnataka, where the problems of everyday life often lay under the cloak of lush greenery. Scarcity of drinking water, persistent agricultural challenges, and limited access to education painted the backdrop of my childhood. However, those adversities ignited a dream as vast as the open sky. I wanted to find solutions for my community and make a meaningful impact through education and science.

My dream was to be a medical doctor, but life had other plans for me. That unfulfilled aspiration evolved into a fervent desire to earn a doctorate, and I began my journey with humble yet determined steps.

The early years

Home was the first school, where my father, Sri Channabasappa K, laid the foundations of my education and taught me the art of hard work and resilience. Given the lack of formal teachers in the village, my mother refined my vocabulary and kindled my passion for Kannada literature. Her encouragement shaped my academic path, and I moved to my grandmother's house to attend high school.

While pursuing my bachelor's degree in Chemistry, Botany, and Zoology (CBZ), I balanced academics with athletics, volunteering and Kannada literature, which honed my leadership and resilience.

When I received multiple offers for a master's programme, I made a bold decision: to take up Biotechnology at Kuvempu University. I was the only student from a CBZ background in a class of 43 biotechnology graduates. Initially, I was overwhelmed by unfamiliar terminology and concepts, but I did not give up. I not only mastered the subject but graduated with distinction.

This phase was a turning point in my life. I joined the MTech (Nanoscience and Technology) course at Kuvempu University, supported by a Department of Science and Technology (DST) fellowship. I also bought my first laptop, a prized possession that symbolised my progress. With mentors like Shivanna M from Kuvempu University and Manjanna J from Rani Channamma University, I discovered my passion for utilising nanotechnology in agriculture. These mentors believed in my potential and nurtured my aspirations. My hard work was recognised with a Woman Scientist Award at a state-level conference organised by *Swadeshi Vijnana Andolana*.

Vision takes shape

Despite societal pressures from my paternal family to prioritise marriage over higher studies, I stood firm. My parents, sister, and brother supported me in my decision to choose research. A brief stint as a guest lecturer in the Biotechnology department at Kuvempu University solidified my resolve to pursue a PhD.

At the urging of my best friend, I applied for a PhD at the National Institute of Technology Karnataka (NITK), Surathkal. Clearing the entrance exam and interview round felt like an out-of-the-world experience. I was admitted to the PhD course with an MHRD fellowship and began my research journey under the guidance of Vidya Shetty K, a recipient of the Satish Dhawan Award. This also marked a milestone as I was the first woman from my village to join NITK.

My research was inspired by the struggles that I saw personally in my village, especially the lack of clean drinking water. I developed heterostructured nanocomposites for wastewater treatment.

Shankramma's research team at National Institute of Technology Surathkal (L to R): Deekshita Kulal, Amrutha Shet, Shankramma K, Vidya Shetty K, Minimal, Sopiya, Sreeja, Priyanka and Manjula P. Photo credit: Tritila S

Currently, I am working as an Assistant Professor in the Division of Nanoscience & Technology, JSS Academy of Higher Education and Research, Mysuru. I am guiding four PhD scholars and many postgraduate students. My novel work in nanotechnology to restore the environment and facilitate sustainable agriculture is aiding rural communities, such as the one in which I spent my childhood.

A legacy of gratitude and inspiration

I owe my success to the sacrifices of my parents, the guidance of my mentors, and the encouragement of my family and friends. None of this would have been possible without them.

My PhD journey not only moulded my academic career but also taught me invaluable life skills — time management, effective communication, resilience, and the importance of balancing intellect with hard work.

I often tell my students, "If you want to become a truly smart human being, do a PhD". It shaped me as a person, teaching me perseverance, adaptability, and humility.

My grandfather believed that the highest rewards for investing in education and helping others are in the very act. "No matter how high the designation or success you achieve", he taught me, "humanity matters the most. Be quiet, follow your principles, and be a role model". These words have become the bedrock of my life.

My father passed on this wisdom by enabling rural students to pursue higher education, and I follow in his footsteps. I actively volunteer to empower underprivileged students, believing that education is the key to transforming their lives. My commitment to serving others, both as a scientist and as a compassionate individual, remains central to who I am.

Shankramma's research team at the School of Life Sciences, JSS AHER, Mysuru (L to R): Jobin Sibu, Hrithik, Sarang Krishna, Vishnu, Khalander Bibi, Karthika, Shankramma K, Nihala Nesrin, Sushmashree K, and Prathibha H.D. Photo credit: Uday

From dreams to reality

From the dusty lanes of my village to the global stage of science and innovation, my journey has taught me that no dream is too big, and no obstacle is insurmountable. Today, I am not just a scientist; I am a mentor, a role model, and a beacon of hope for aspiring minds back in my village. My life's purpose is to show the world that with determination, resilience, and support, anything is achievable.

As I look back, I carry forward the lessons of hard work, kindness, and humility, determined to inspire and uplift others.

Because no matter where you come from, greatness is within reach if you dare to dream and never give up.

The article is edited by Yousuf Khan and Ankita Rathore

Setting up a new department: Celebrating challenges and success

Arun Upadhyay

Arun Upadhyay set up not only his own lab but also played a key role in establishing the Department of Bioscience and Biomedical Engineering at the Indian Institute of Technology (IIT) Bhilai. In his article, he writes about the three significant aspects of the job profile of an early-stage academician.

When I joined the Indian Institute of Technology (IIT) Bhilai almost a year ago, the Department of Bioscience and Biomedical Engineering was in its early stages of development. Joining as the first faculty member recruited to the new department made me both excited and nervous. Although I had been waiting and preparing for quite some time to start my independent scientific career, landing in a department that had just come into existence was not part of my plan.

But life brings surprises, and I took this surprise as an opportunity. Soon, I started realising that my progress had synced with the department's journey, and we would both grow together.

"Being a scientist is an endless journey. I just keep travelling and enjoying myself".

In January 2024, Arun left his postdoc lab, thinking about finding his own niche. A year later, he have a group of talented researchers. (In pictures: Left: Arun; Right: Amrendra, Sadhna, Arun, Deepak, Sandeep, Ashwini). Photo Credits: Somya and Ravindra.

The researcher

"Establishing the first lab in the department is both exciting and challenging; your experience and patience will sail you through".

When I accepted the offer from IIT Bhilai, I knew the next few months — maybe even a year — would be challenging, and I might not be able to do much active research. That proved to be true. I got my lab space with some funds to kickstart my research. Admittedly, the funds were insufficient to start and run a new biology lab, primarily since my research relies heavily on animal cell culture, molecular biology, biochemistry, and mass spectrometry. The consumables alone require not just one or two but multiple extramural grants.

"When you join an old IIT or a well-established university, you get several institutional instrumentation facilities that may help you start your work. But in my case, that too was missing. I just got a room".

The next challenge was securing my own research funding. I submitted multiple grant proposals, but the processing time of most agencies is too long, and I am still waiting to hear back. Fortunately, I had an existing research grant from the BrightFocus Foundation, USA, and I was fortunate that the funding agency and my postdoctoral mentor helped me transfer the funds to IIT Bhilai.

Meanwhile, when I had nothing much to do, I tried new things. It has always worked for me. I received an IndiaBioscience Outreach Grant to address postpartum depression, a highly prevalent problem, using artwork and infographics. Meanwhile, I began searching for additional resources to support my research. I established several national and international collaborations and submitted multiple grant applications in collaboration with others. When things are slow, you can always look for collaborators who can share their resources and support you in getting back to business.

The teacher

"Unless you are in a research institute, be prepared for teaching responsibilities".

Teaching is crucial in an academic institute, especially in IITs, IISERs, and universities. As expected, soon after I joined the department, I started teaching BTech and MTech courses. It was not easy, coming from ten years of research as a doctoral and postdoctoral fellow, where you gain little to no teaching experience. Additionally, the curriculum you teach may also be new. I started with two courses immediately after joining, and now I am teaching three courses to BTech, MTech, and PhD students. Trust me, in the initial years, teaching takes up a significant portion of your time. I had to design new courses, too.

A few months ago, I submitted a proposal to start a new MTech programme in Biomedical Devices, and we recently received funding from the Department of Pharmaceuticals, Ministry of Chemicals and Fertilizers, Government of India. Next, I am working on introducing a BTech programme in the department. Remember, these are part of your job profile, and you must be prepared to take on such responsibilities.

Arun teaching at his class. Photo Credit: Sourabh

The administrator

The first two roles, researcher and teacher, were familiar to me and part of my academic training. But there are other responsibilities that don't fit well into either category. I can call these responsibilities part of academic administration. These include purchasing, administration, recruitment, and planning and executing events. I never received any formal training for a lot of things that I do apart from research and teaching. Also, they are the most time-consuming part of your job. You need to spend hours understanding the rules before executing anything new.

After research and teaching, Arun spending hours to complete loads of administrative responsibilities. Photo Credit: Amrendra

"I was trained as a core researcher, but now my job profile has multiple verticals: research and teaching are only two of those".

Your effort matters the most

I began my scientific research journey as a PhD student at the Indian Institute of Technology Jodhpur and am now leveraging my experiences to help establish a new department. Your efforts may not yield immediate results or get acknowledged today, but consistent dedication ultimately leads to success. I feel blessed to have received this opportunity. In this process, I have cultivated an environment that fosters a collaborative niche for future colleagues and students to thrive together.

For those who are planning to become independent investigators, I would summarise my experience in a few words:

I continue to strive forward without dwelling on my failures, and that is how the journey of a researcher goes. This journey has taught me many things. After years of training and now working as a PI, I can confidently say that perseverance, dedication, consistency, and integrity are the four pillars that keep science alive.

The article is edited by Yousuf Khan and Moumita Mazumdar

The road less travelled: My path to becoming a PI in India

Rajalakshmi Srinivasan

Rajalakshmi Srinivasan leads the Aging Genomics lab at the Institute of Bioinformatics and Applied Biotechnology, Bengaluru. In this article, she shares how her India-centric path has shaped her career and sheds light on the pros and cons of pursuing postdoctoral training in India.

Be ready for opportunities!

At a time when internet access was woefully limited, especially in rural areas, I learned about the Summer Research Fellowship Programme offered by the Indian Academy of Sciences through a poster in my college library. I applied on the very last day of the deadline by post and was selected to work at the National Brain Research Centre, Manesar, Haryana.

It was a happy moment for me, but at the same time, I was worried whether my parents would allow me to go that far for two months. To my surprise, they did not hesitate. My father immediately booked my ticket to Manesar, considering my interest and my future. This moment marked the beginning of my research journey, which started in a remote village in Tamil Nadu and led to many prestigious institutions across the country as my career progressed.

In addition to enhancing my CV, these experiences solidified my ambition to become a scientist. Although I graduated with a gold medal, I was still exploring options for the next phase of my career. I learnt of the newly launched DST-INSPIRE scholarship scheme through a newspaper advertisement, applied and got selected.

I joined the National Centre for Biological Sciences in Bengaluru for my PhD after lengthy negotiations with my parents regarding the timeline. Before I had planned my PhD, my parents had already drafted a timeframe for its duration, as well as my marriage and other milestones. These timelines were impractical, but fortunately, my project turned out well. I published two first-author papers within three years, meeting the requirements for graduation. During my PhD, I also got married and had a baby. Although winding up my PhD, having an infant was difficult, the encouragement from my PhD supervisor, support from my entire family, and the daycare facility on the NCBS campus significantly eased my burden.

Rajalakshmi receiving the best poster award from K. VijayRaghavan at Annual Talks, NCBS, 2012. Photo Credit: Anshul Sukhwal (Source: NCBS News)

"I believe that productivity at work improves when parents feel their children are safe. I wish for mandatory on-campus daycare systems at all institutions and workplaces, which could encourage more women researchers to engage and contribute to science in India".

Breaking the trend

Although many PhD graduates pursue a postdoctoral fellowship abroad, I chose a different path, considering my family and career. My daughter was just two years old, and I needed to spend more time with the family. I decided to start my first postdoctoral position in India, planning to go abroad for my second one later. I received both the SERB-National Postdoctoral Fellowship (N-PDF) and DBT-Research Associateship (RA) postdoctoral fellowships, and I opted for the former. However, the first postdoctoral training took longer than I anticipated. It proved to be an extraordinary tenure filled with challenges and plenty of scope for learning through experiences I might not have encountered even if I had gone abroad.

I was involved in several projects and had a rewarding collaboration. I recognised my strengths and potential to work independently. My supportive and motivating postdoctoral mentor helped me understand the complexities of establishing and successfully running a lab. Throughout my postdoctoral research, I developed essential skills, including designing projects, writing and reviewing manuscripts, crafting grant applications, mentoring interns, delivering talks, and organising events.

The support system: Rajalakshmi with parents and in-laws after her PhD thesis defence at NCBS, Bengaluru. Photo Credit: Raghavendran Renganathan

Lockdown: Staying back, levelling up

I participated in YIM 2020 as a PDF, which altered my plans to pursue a second postdoctoral position abroad. Several postdoctoral researchers who had returned to India discussed their struggles to secure academic positions and the effort they invested in rebuilding their networks after spending many years abroad. This made me question the time and effort to relocate my family.

Before I could think it through, the COVID-19 lockdown froze movement across borders. I decided to stay in India and strengthen myself to compete with my returning counterparts. I completed my postdoctoral projects, published my work, and used the period to write a research proposal, attend workshops, and start the application process.

My applications were well received by top institutions, and they invited me to deliver talks. Despite receiving positive feedback, the results were not so positive. Lack of international exposure being one of the reasons for rejection. I realised that obtaining independent fellowships might increase my chances of securing academic positions. I applied for research grants and fellowships from DBT, DST, and DBT/ Wellcome Trust India Alliance. These fellowships are highly competitive, as postdoctoral researchers from both India and abroad are eligible to apply. I was awarded the DST-INSPIRE faculty fellowship, followed by the DBT-M. K. Bhan Young Researcher Fellowship. Suddenly, my situation had shifted from “nothing in hand” to “options to choose from”. I chose to accept the DST-INSPIRE faculty fellowship, as it supports the establishment of an independent research lab. I joined the Institute of Bioinformatics and Applied Biotechnology (IBAB), Bengaluru, in October 2021, while the lockdown was still in effect.

Building a team: Slow and steady!

IBAB provided me with most of the basic resources to kickstart my project. Within a few months, my team included four dissertation students from various institutes across the country and two project assistants.

Our very first experiment was successful in identifying a phenotype to work with. However, we were unable to progress faster as we had run out of resources for that year, having spent them on the purchase of basic lab chemicals and other essential requirements. Reagents, antibodies and consumables – everything was too expensive. Understanding the importance of conscious fund management, I decided to decrease the group size, seek additional funding and prioritise. I designed a few computational projects so that the lab could function with minimal funding. In the meantime, I applied for extramural grants to expand my research interests. A few rejections later, I was awarded the highly competitive Core Research Grant from Anusandhan National Research Foundation (formerly SERB). Currently, I have two extramural grants, PhD students, and project interns, working on various aspects of aging and genomics.

I trust that contributing to the growth of the next generation of scientists is the most rewarding part of research, motivating us to persevere despite challenges. I teach data analysis in genomics and microbiology at IBAB and organise workshops on advanced topics. We look forward to growing as a successful team in the coming years.

Rajalakshmi with her current lab members and interns of the Aging Genomics lab at the Institute of Bioinformatics and Applied Biotechnology (IBAB). Photo Credit: Shiva Kumar (IBAB)

Pros and cons of being trained in India

Relocating to a different country for an extended period can be particularly challenging for women in science. It often leads to various logistical issues, such as the two-body problem (where both partners need employment), disruptions in their children's education, and the loss of the family support system.

Although international exposure can be valuable, pursuing an overseas postdoctoral position should neither be seen as the only path nor bias recruiters. Establishing international collaborations and attending workshops and conferences can serve as alternative ways to gain international experience. In my view, doing your postdoctoral training in India comes with its advantages and a few challenges:

Pros

- Prior exposure to the work culture, recruitment process, funding system, and research environments in India facilitates easier adaptation.
- Simpler to explore vacancies and visit recruiting institutions.
- Enhanced opportunity to interact and network with faculty members and peers from the recruiting institutions.
- Familiarity with others in the same field helps establish collaborations and assistance with projects.
- Being close to the family and home offers significant support, especially when raising a child.

Cons

- Lack of exposure to an international research environment.
- Some institutes prefer postdocs who have returned from abroad, so to compete without international training may require extraordinary skills.
- Relatively fewer fellowships/research grants are available for PDFs trained in India. Some start-up grants are reserved for re-entry fellows. To my knowledge, there are no such fellowships/grants that solely support postdocs trained in India.

The article is edited by Yousuf Khan and Moumita Mazumdar

The unlikely scientist: On finding my path in Indian science

Kanti Kiran

Kanti Kiran is Associate Professor of Plant Biotechnology at Gujarat Biotechnology University, Gandhinagar. In her article, she reflects on her accidental entry into scientific research, the importance of second chances and learning to adapt in the face of unexpected challenges.

Wandering around green plateaus and hills with friends back in Koraput, a valley in Odisha, was like living in paradise. Like any child, I aspired to be everything that fascinated me: a gardener (hilarious, isn't it?), teacher, photographer, fashion model, doctor, singer, fighter pilot. The most extraordinary was probably becoming a bride.

At 11, I had to move from that serenity to a densely populated big city. It was shocking and it felt like my life had fallen apart.

Before I could adjust, my family shifted again. Within two years, my thought process completely changed, and a playful, carefree child turned into a very shy introvert.

Lab bench: To be or not to be

While pursuing my masters in Botany from Lucknow University, a friend asked me to appear for an interview at CSIR-National Botanical Research Institute (NBRI), Lucknow. I knew that I was not inclined to enter research, but I was curious, and I got selected. Within two days, I understood what it took to be a good researcher and where I needed to improve.

"All discussions were on science, yet it felt like nothing was sinking in. I felt that I would not survive. But I ended up spending more than five years in the lab and got my PhD degree".

Those five years changed my entire life. The lab had the best colleagues and mentors I could have imagined. I learnt what doing science is actually like.

My family had moved to Delhi-NCR. While my PhD defence was pending, I joined a private bioinformatics firm in Noida. Despite my initial perception, the company had some great people with strong ethics, exceptional management skills, and vision. But I missed the lab environment, and the company was probably shifting. I also defended my thesis in 2006. I had to move, but I was completely clueless. Although I had overseas postdoctoral offers, I did not accept them due to family constraints.

I was looking for opportunities in the Delhi-NCR area and did not want to take a purely teaching job. I joined as a research associate at the South Campus, University of Delhi. Commuting took two hours with four public transport changes. The lab was an empty room and needed to be established from scratch. Within a year, I figured that this was not what I wished for. Moreover, when I got typhoid and dengue, the mentor was insistent that I join the lab immediately or face consequences. I thought, so be it and resigned. Clearly, all that glitters is not gold.

Finding my way to become an independent PI

I tried several things, but had three conditions: I would not leave Delhi-NCR, avoid purely teaching jobs, and not join another inexperienced mentor. I joined the ICAR-National Institute for Plant Biotechnology (NIPB), New Delhi, in 2011, as a postdoctoral research associate. It was not easy to start all over again, and the mega project involved five other premium institutes of India.

This second chance introduced me to genomics, something completely different from molecular biology and plant transformations. After whole-genome *de novo* sequencing of a wheat fungal pathogen, we assembled the genome and performed downstream analyses. It was a great learning experience. When that project ended, I switched to different projects in the same lab.

Kanti Kiran with her MSc dissertation students at GBU. Photo Credit: Kanti Kiran

I became an independent PI in 2018. But there was a year-long gap before the sanction of funds. Though it was hard, I was excited and focused, but life had other plans. My mother's health started worsening suddenly. She had not been well for quite some time. Year 2019 was immensely bad, and unfortunately, in early 2020, just before COVID-19 struck India, I lost her forever. Next came the six-month strict lockdown. The personal and professional losses impacted me strongly. I still have not figured out what pushed me to gather the courage to start over. In 2021, I was diagnosed with COVID-19 and was severely affected. I luckily survived and returned to work after three months. I was diagnosed again in early 2022. These unwanted and uncontrollable events significantly impacted my health, work, and results.

Translocation: Getting a job at GBU

In January 2022, while recovering from COVID-19, I interviewed for an associate professor position at Gujarat Biotechnology University (GBU). Meanwhile, I focused on writing proposals for new projects.

"One particular evening, while it was raining heavily, I received a call while on the Delhi Metro: 'You have been selected for the job at GBU".

I had completely forgotten since six months had passed. I could barely hear and was unsure what "GBU" meant. The next morning, they called again, and it was a moment of joy indeed. My father was happy but concerned that the job was not in Delhi. Nevertheless, I joined GBU, Gandhinagar, in August 2022. Currently, my father and I live far away, all on our own, in two different states.

This is my first regular government job and involves teaching, which I had long avoided. It has been a great learning experience. GBU aims for excellence in advanced biotechnological research. I have applied for many extramural grants within the past two years and received the prestigious IGSTC-WISER award in 2024. With GBU's seed grant, I initiated my research lab. I hope to be consistent and deliver satisfaction in my job responsibilities.

Kanti receiving the IGSTC-WISER award from Jitendra Singh, Minister of State (I/C) for Science & Technology and Earth Sciences, Govt. of India. Photo Credit: IGSTC-WISER team

Reflections from my journey

I have understood the meaning of "nothing stays permanently in life". I experienced it very closely. Unforeseen, uncontrollable situations should be dealt with by accepting them with a 'no loss' attitude.

Also, analysing complex situations helps me in making clear decisions. Consistency and being self-motivated were traits I developed. Importantly, I am still a shy and introverted person, but that has never caused any hindrance.

I have become more observant of people and conserve my energy for my work, but speak up when required. I have become a good listener, making me approachable for students and others. I follow the motto of "speak less, observe more, think practically and work regularly".

The article is edited by Yousuf Khan and Ankita Rathore

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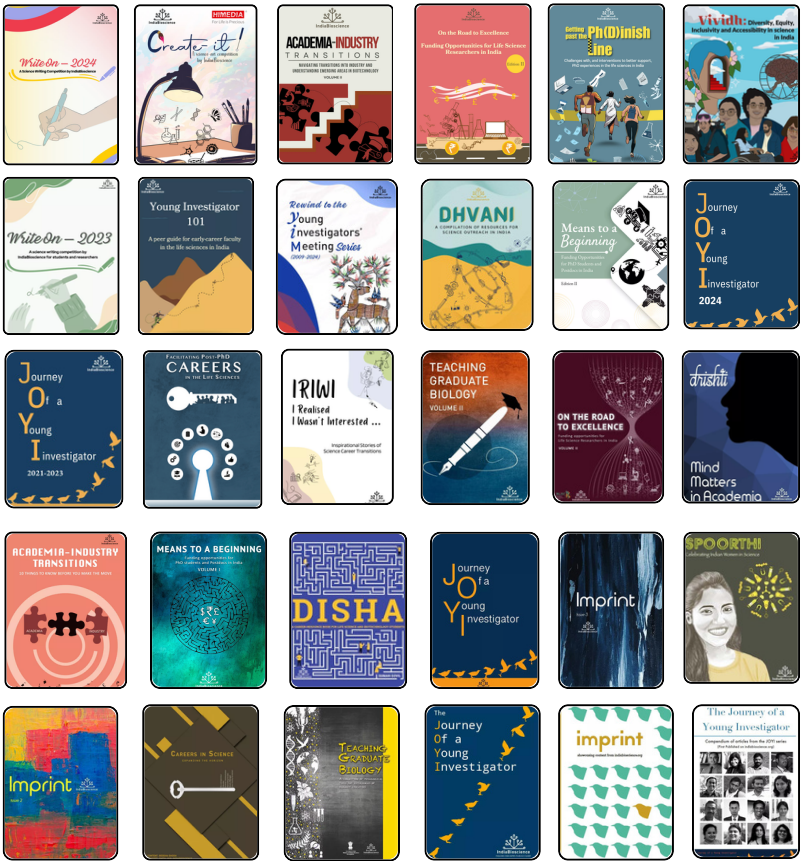

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