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IMPRINT

NIBMG in Bits & Bytes



Scientist Talks
In Public Eye
Research Spotlight
Events, Award & Outreach
Creative Corner
Conference Chronicles

The design of cover made by NIBMG students on Diwali, 2023. Photo courtesy: Animesh Kumar Singh, Vinay More

Design by Vinay, Divyank and Jyotishman

Research office



-Dr. Alpana Dave

While 2023 was the year of transformative initiatives in India such as NRF, it was also a year when our lives got back to “normal” after the COVID pandemic. mRNA-based vaccines were administered to a large population across the globe to protect from the SARS-CoV-2 virus. The Nobel Prize in Physiology or Medicine 2023 was awarded to biochemist Katalin Karikó and immunologist Drew Weissman for their breakthrough discovery which made it possible to develop mRNA vaccines. Karikó and Weissman together discovered that unlike unmodified mRNA produced in vitro, modified nucleosides in mRNA do not produce immune response. These modified mRNA also produce higher amount of proteins compared to their unmodified counterparts. This pathbreaking discovery, published back in 2005, was a result of a fruitful collaboration between a biochemist interested in developing methods to use mRNA for therapy and an Immunologist interested in understanding the role of dendritic cells in immune surveillance and vaccine response.

Talking about our collaborations, NIBMG has partnered with research and educational Institutes around the area namely, RISE-IISER, IIT Kalyani, AIIMS-Kalyani, BCKV, Kalyani University, Adamas University and MAKAUT, to form the Kalyani Innovation Network (KIN) with an aim to establish entrepreneurial ecosystem in this region of West Bengal. This network will work towards creating awareness, nurturing innovations and supporting startups. We have also initiated a partnership with LV Prasad Eye Institute for a project on role of microbiome in Diabetic retinopathy (PI: Dr. Souvik Mukherjee). Through the project, Dr Mukherjee will be a part of a Pan-India project evaluating gut microbiome of Indians with diabetes mellitus or diabetic retinopathy. Continuing our contributions in consortium projects, NIBMG is now a part of another project which aims at sequencing MTB clinical strains to determining drug resistance and strain lineage (PI: Prof. Arindam Maitra).

In this issue of IMPRINT, we bring a candid interview of our former Director and now Visiting Professor, Prof. Saumitra Das where he shared his childhood experiences and highlights of his journey in science. The Research Spotlight segment showcases research of Mr. Partha Das and Mr. Arghya Dey. Apart from our regular sections focusing our publications, awards & events and creative corner, we also have a section where Ms Mousumi sarkar talks about her experience of attending an International conference .

In an effort to reach out to a larger section of the NIBMG family, we will introduce new segments in the upcoming issues of the Newsletter; so watch out for this space.

Scientist Talks



Stride with Saumitra



- **Can you share a pivotal moment in your career that inspired you to pursue a path in academia and research?**

During my school days, I actively engaged in various elocution competition, Science seminars, and competitions. While I was in Class 11 at St. Xavier's College Calcutta, I participated in a district-level and subsequently state-level Science Seminar competition organized by the Birla Institute of Technological Museum (BITM). The theme revolved around important discoveries in Genetics and was exposed to the fascinating field for the first time. Despite the common inclination among peers towards engineering or medical careers, I dedicated myself to understanding genetic breakthroughs. Surprisingly, I excelled, securing the first position in the Calcutta district and later representing the city in an interstate competition where we clinched the runner-up position. This experience ignited my interest in genetics, fostering a newfound curiosity and redirecting my academic pursuits.

Interestingly, St. Xaviers didn't offer me biology initially, 'since during interviews, although I understood the questions, I struggled to communicate in English effectively (being trained in Bengali medium), particularly in botany. Later the H.S Unit in charge, Prof. N.K. Kuri, acknowledged my achievements, advocated to Principal (Father Hincq) for my inclusion in biology. Eventually, I was granted entry, a pivotal moment steering me away from medical. St. Xaviers' esteemed reputation further motivated me to seize the opportunity despite the initial setbacks. Subsequently, another twist arose when my M.Sc. application was misplaced, compelling me to pursue upcoming subject biochemistry (not Chemistry), incidentally a field tangentially related to genetics. Reflecting on these events, I recognize how my early experiences and challenges shaped my academic and research trajectory. While the transition from vernacular to English-medium education posed initial obstacles, I persevered, embracing the journey with enthusiasm. In hindsight, I appreciate how these pivotal moments molded my academic and research endeavors, ultimately leading to a fulfilling pursuit in genetics and biochemistry.

- **As the founder of the iPhD program, what inspired you to initiate the program and what qualities were you looking for while recruiting the students? How have those expectations influenced the program's culture?**

I was coordinator for integrated Ph.D. in the Biological Science Division of Indian Institute of Science for 2 terms. I found that you can attract talent at an early age and try to keep them impressed in science and research. But later, because of different compulsion, they ended up going abroad or somewhere else, and we were not able to retain those talents. And particularly now I can easily say it, there were a lot of good applications coming from West Bengal to IISc. After I joined NIBMG, I was thinking that these talents I could easily retain in West Bengal if

Stride with Saumitra

I can provide some similar infrastructure, training, facilities and the curriculum. So, that played it. I mean, I thought like maybe we should introduce similar kind of a program here, what we call it, “catch them young”, retain them and then keep them motivated in the research field in the Institute. And another thing that I figured that somehow the number of students were very less when I joined NIBMG. Perhaps, because we just moved from the temporary location to the new campus. In the earlier location, we didn't have enough space and didn't have many students, maybe only 8 or 10 Ph.D. students were there. Unless I started something very new, it was certainly difficult to attract more students. But this new program infused new blood and new enthusiasm in the Ph.D. program as well. Pratyusha is one of the first batch, I think and thus we could successfully attract not only the Integrated Ph.D. but also helped us to attract other Ph.D. students because you know the good people always attract even better people. That's the ecosystem, and everybody looks at it who is where, so the friends network also helps. Now we have around 80 students, so 8 to 80 jump was possible just because we took a decision at that time. It was a collective decision, and I was just a catalyst there. My faculty colleagues were supportive and very helpful to run the program, worked hard to come out with the good curriculum, especially Sreedhar and Samsiddhi. It's a good move for the Institute to retain talents in that place and attract talent from outside.

- **What do you consider the most significant achievements of NIBMG under your leadership?**

You know I have just found that everything in my life doesn't go according to my plan. Everything happens all suddenly. You know, I was there and then doing all routine stuff, but suddenly COVID happened.

They were looking for a virologist. They were looking for a genomicist. Then they found this virologist who happened to be the director of a Genomics Institute. So, they just handpicked me and then made me the coordinator of INSACOG, for the sequencing of Covid genomes. And I think that's the greatest achievement- putting NIBMG on the national map. And now the visibility of NIBMG has gone really manifold due to their contributions during the COVID times. The relentless sequencing effort, and the quality of service provided put NIBMG into the national genomics network and the national science network. I think I saw a clipping somewhere in a movie where they mentioned ‘Genomics Institute in Kalyani’. So essentially, the ‘Aam Janta’ came to know that there is an institute who can handle that genomics. So that's a big achievement. You know, such a short time, I was just there only three and a half years and I have been here in IISC for over twenty-six years, but in those three and a half years, I could achieve something which will probably keep me happy for the rest of my life. Because you know, you could actually achieve something which you wanted to and put the institute that you are heading onto the map and everybody's mind. I mean NIBMG did such a wonderful job that people started having confidence in NIBMG, so I feel this is a big achievement.

- **In your interactions with students, what aspects of the learning process do you find most rewarding?**

I consistently find myself learning from my students, who often possess more knowledge than I do. My role is akin to that of a facilitator or catalyst, guiding them by posing questions and receiving insightful answers in return. While at NIBMG, although I didn't formally mentor students, I engaged with them regularly, fostering both personal and scientific exchanges.

Stride with Saumitra

I've come to appreciate that students, open to new ideas and suggestions, offer innovative perspectives, often surpassing the insights of colleagues who may become entrenched in their viewpoints. In contrast to our own academic experiences, where resources were limited and access to cutting-edge information was challenging, today's students benefit from an abundance of information available online. Even my daughter is well informed through social media platforms and prompts discussions on recent developments in science. I firmly believe in empowering students, recognizing their potential to inform and educate us. This philosophy guides my interactions with students, both direct and indirect, as I encourage them to pursue their own inquiries and questions. By facilitating their exploration, I aim to ensure that their challenges are feasible and their learning experiences fruitful. Through this approach, I've gleaned invaluable insights from my students, recognizing their role in keeping me abreast of contemporary knowledge. Reflecting on the evolution of teaching practices, I recall a humorous anecdote shared with a senior professor, lamenting our shared weakness in immunology—a consequence, we jest, of our common teacher's shortcomings. This underscores the importance of effective teaching methods, acknowledging that comprehension difficulties often stem from instructional shortcomings rather than student inadequacies.

- **What was the biggest challenge you faced while heading the Institute during the pandemic?**

During the pandemic, the major hurdle was during the lockdown and curfew, during the curfew time, you are not supposed to go out. Many students were all stuck in the hostel. But I had to bring those staff who are actually going to do the sequencing because that has to be

reported within 24 hours to the Health Ministry that these samples we have received, this variant, this is the abundance and you know I used to get midnight call from the secretary, DBT and say, “hey Saumitra, I think there is a Parliament discussion going on, what is happening and what are the updates?” and my answer line started with feedback from Arindam and his team. I had to make sure that those people get some vehicle to come into campus.

We used to have separate designated vehicles to commute people from Calcutta, different places, and there were two buses which used to come from two different routes to get them here and Nabarun babu (Manager-Admin) made sure that they are not caught in the middle. We had all kinds of clearance from the district magistrate and others, to make sure they were at NIBMG. So that was a big challenge to convince the local authority that this is an essential service that NIBMG was providing, and these people must be allowed to come out of the house and do it. Once an unfortunate incident took place, Amal Babu (Manager-Finance), was actually beaten by police at night for violating rules. , he was not carrying any ID!. So, this was a big challenge and it helped me to take some real drastic decisions to keep some of those people in the guest house rather than commuting, so that we have some machinery to continue the work that government is desiring from us. In the end we delivered it, but it was a tough challenge to get the Institute running and all the staff. I think we were not even closed on Sundays, forget about lock down.

- **As a mentor, how do you tailor your guidance and support to meet the individual needs and goals of your mentees, both early career researchers and students?**

You know one thing I learned from NIBMG is

Stride with Saumitra

precision medicine or personalized medicine. You cannot really have the same strategy to motivate everyone, because every individual is different. Everybody's threshold is different. I usually try to understand their get up, their mental setup, their expectations, their frustrations, their ambitions, and then try to play around to help amend them. This is something more counselling rather than mentoring, because most of the time the students do not have to be mentored. They are very good. But at times, they are frustrated, and you need to counsel them so that they can actually bounce back to their strength. And the same thing holds true for the faculty. I think sometimes the faculty, particularly when they're young, get frustrated because they want to publish in high impact factor journals. And that is not getting through. They want to have bright students but are unable to attract the brightest students. There are several levels of frustration. When I was in NIBMG, some of the faculty did not have the facilities that they had been looking for, for ages, and we had to make sure that they get those facilities, right. So that is personalized, caring and mentoring that I try to provide and will also keep providing to the students as well.

- **What strategies do you employ to stay resilient in the face of setbacks or challenges in your research, and how do you maintain a positive outlook?**

I learned a valuable lesson from one of our esteemed senior professors, Prof. Sarat Chandra, during one of his presentations. He advised that upon receiving a rejection letter from an editor, it was essential not to rush into immediate action. This advice was particularly relevant when computers were not as user-friendly as they are today. He emphasized the importance of remaining calm upon receiving such letters, suggesting that with time, one often realizes the validity of

reviewers' comments. Despite initial disappointment, acknowledging and analyzing these comments can lead to significant improvements in one's manuscript. Personally, while it's natural to feel disheartened when a well-crafted article faces rejection, the feedback from reviewers serves as a constructive guide for enhancement. Rejection without feedback at the editorial level, however, remains frustrating, challenging one's confidence in journal selection. Another aspect of my academic journey involved encountering numerous negative results, which ultimately led to unexpected discoveries. For instance, during my Ph.D., an experimentation mishap revealed gel acceleration instead of the expected retardation, sparking the concept of DNA bending, in nucleic acid-protein interactions. Similarly, in my postdoctoral research, attempts to express poliovirus RNA in yeast initially yielded negative results. However, further investigation unveiled the presence of small yeast RNA molecules that inhibited viral RNA translation, offering insights into potential antiviral strategies. Once the article was published, the very next day, the New York Times splashed across its front page a groundbreaking headline: "Cure of Common Cold in Baker's Yeast." This revelation addressed the pressing issue of the common cold, caused predominantly by the rhinovirus. During an interview, I was asked why I chose to address polio over the common cold, given the availability of vaccines for the former and the absence of a cure for the latter. This inquiry sparked the genesis of a new endeavor. At UCLA, where I conducted my research, a start-up company was formed to develop antiviral molecules targeting viral RNA exclusively, leaving cellular RNA untouched. These experiences underscore the importance of resilience in scientific inquiry. When faced with setbacks, I encourage students to focus not on the failure itself, but on the reproducibility of their observations.

Stride with Saumitra

By embracing unexpected outcomes and adapting hypotheses accordingly, researchers can uncover valuable insights that defy conventional expectations.

- **Is there anything you wish you had known or done differently during your tenure as director?**

I just wish if COVID was not there, I could have done much better, because of the COVID a lot of my planning got obstructed. I mean, first one and half years. I was mostly busy completing the building and the infrastructure facilities and all, and then suddenly the COVID came and there was an issue of survival. People were more worried about whether we would be able to survive or not. We lost so many people, so many near and dear ones. So that time I couldn't really concentrate much. I still feel that if Covid was not there, I could have done a lot more than what I could have achieved in that short time.

- **In your opinion, how can academia better support the mental health and well-being of researchers, especially considering the pressures and uncertainties that come with the profession?**

I will just give you an example of Indian Institute of Science. Here, we have a Center for Wellness. We call it Wellness because even when I'm frustrated, I can go there and talk to the people and get their help. Help to overcome your fear, your anxiety, your frustrations. People need to have an outlet to vent out to. They need to release tension, release the pressure, release the frustration to somebody, and that somebody may not be always your colleague or your close family. That could be somebody else. So, it is important to have a Wellness Center in every academic institute with properly trained counsellors and psychiatrists.

A lot of small problems can be handled while they are small and before they are able to grow. Sometimes this can also help us detect at risk people who have not quite really developed any problem yet but could develop a problem if ignored for long. So, I think it is important to have a support system in every academic setup, not just for academic frustration. Students do not just get frustrated because they do not do well in exams. Other than that, they also have their lives. You know, even if the team that you support keeps losing, you get frustrated. I'm sure so many people were frustrated when India lost to Australia. So, this kind of frustration, people cannot really control. We cannot just blame academia alone. It is the general health. General mental health. I think there should be some system in place to deal with the mental health of people in academia by professionals.

- **Tell us one aspect you felt or observed in the faculties and in the students of NIBMG which you would want to change**

I may not possess the direct authority to enact change, but I am committed to addressing this issue to the best of my abilities. You see, what I've noticed, not just at NIBMG but also at institutions like IISC, is that many of us tend to remain within our comfort zones. We hesitate to step out, to take risks, or as we say in Bengali, "Bapi Bari Jaa" which means to hit the ball beyond the boundary. There seems to be a lack of ambition and willingness to take on challenges.

Recently, I had a lengthy discussion with Prof. Rajesh Gokhale, the secretary of DBT, who echoed similar sentiments. He emphasized the need for more ambitious projects and investigators who strive for seemingly unattainable goals rather than chasing low hanging fruits. While it's easier said than done, I understand the constraints - limited facilities, funding, patience, and student availability.

Stride with Saumitra

Yet, even within these limitations, if we foster ambition and perseverance, remarkable achievements become possible. This is a collective effort we must undertake to push the boundaries of what we can achieve, not just at NIBMG but across various institutions, both governmental and private sector. We need to embrace ambitious projects rather than settling for comfort in our current endeavors. It's a mindset shift we must embrace for our own growth and the advancement of science.

- **How do you balance your administrative responsibilities with your interest in research?**

It's very difficult actually. After I left NIBMG and till last November, in between I was very happily doing only research. But now I have become chair of our department, which is almost NIBMG size because of the number of students and faculty. So, the administrative responsibility has gone up again. What I do is essentially after I go back home, I try to do only my research part, like students' interactions, paper corrections, thesis corrections etc. I tried to organize myself when I was director there at NIBMG also. Some of you know that till 11am, I never entertained anybody to come to my room because that's the time I used to allot for research and interaction with my students at IISc. The same way I just tried to do it here. So, you space out your administrative responsibility between 11 to 5 and the rest of the time research. I'm taking classes after 5 here at IISc. If I have time, some days are not so busy, then I call some students and have one-on-one interactions and brainstorming, but otherwise mostly on the weekend and in the off hours. Even my research group meetings are scheduled in the weekend! In the early morning and late night, I do research and other things, but administration definitely takes away time because somebody

has to take those responsibilities too. I mean, because young people need more time to attend to their family, they have to also raise kids. So being a senior, we have to take some additional responsibility. I don't blame that. But you know, if you are organized, you shouldn't complain. You should be able to handle everything. 24 hours is too long.

- **How are the work cultures different in NIBMG and IISc?**

In IISc only Sunday is a real holiday for us. Even on 26th January and 15th August. if you come to lab, you'll see everybody working in the lab. Sundays too. Sometimes I feel embarrassed because I try to take at least one day off, but that also feel bad because students are around in the lab! So essentially that work culture must be within. You cannot really be bound by rules all the time. I try to motivate people so that the urge comes from inside, not from the top. Then people will revolt. If the urge comes from within, then it is your urge that you want to perform. It is your ambition, so you want to achieve, and you do it. Secondly, definitely discipline. It is very important. So, you have to train your brain that this is not the time to relax. The brain always looks for relaxation. So, if you can train your brain that there is no time to relax, it will definitely adapt to that. If you start the day at 11, then the brain knows that there is no pressure to perform. But if you start at 9am, you are telling your brain that there is pressure. So, this kind of discipline helps. I learned this from St. Xavier's. The fathers used to stand near the door with a pocket watch. If you are even five minutes late, he will shut the door. If you miss a class, then at the end of the day while going home, on the notice board you could see all those who had been suspended that particular day. So that's essentially what discipline is. That is the discipline that I learned, and this has to be learned quite early in your life.

Stride with Saumitra

I cannot really make a faculty disciplined now. That is not possible.

- **I understand that personal experiences can greatly impact one's worldview. Are there aspects of your childhood that you believe have influenced your teaching or research philosophy?**

You know, I used to delve into scientific endeavors, and as you may recall, in such pursuits, setbacks are inevitable. There was an instance where I participated in a competition while in school, presenting an innovative concept akin to a ropeway system designed to alleviate traffic congestion. The idea was inspired by similar setups in Mussoorie and elsewhere. Picture this: a tram descending along the rails while an overhead mechanism, propelled by wires and pulleys, navigates congested areas to optimize road space. Despite meticulous preparation, when the judges arrived, my prototype failed to operate. The disappointment was palpable, yet the judge displayed remarkable understanding, urging me to articulate the underlying logic. Through his insightful queries, I bagged the first prize, albeit amidst some amusement from onlookers. It wasn't just about a non-functioning model; it was about the essence of the idea and its potential. These small episodes underscored a crucial lesson: never concede defeat prematurely. I often impart this wisdom to interviewees, emphasizing that until the final moment, the game persists. Learning from failure has been a recurring theme in my life, each setback a lesson in perseverance. It's about maintaining faith in one's abilities and recognizing that setbacks often stem from technical glitches rather than flawed hypotheses.

Rapid-fire

- **Bangalore or Kolkata?**

Kolkata

- **Which actor would you choose to play your role in your biopic?**

Nobody is going to make my biopic. I don't know.

- **If you could have dinner with 3 fictional characters, who would they be and why?**

First of all, I don't enjoy going out to dinner. But if you insist, then Feluda.

- **What's your fav way to spend a lazy sunday?**

Listening to Tagore's songs.

- **One day in your life on which you want a do over, and why?**

That's very difficult actually. It keeps changing, right? When I was in the Andaman, we spent a full day on the beach doing a lot of activities and I thought this is what life is about and maybe I'll just repeat that. But after coming back I got sick because I did too many activities there. So, I don't want to go back! And it keeps changing.

- **An advice that you would give your younger self**

That you should study hard when you are young. I think I should have studied even better.

- **Was COVID a challenge or an opportunity**

Initially, it posed a challenge, but now we perceive it as an opportunity. The distance feels negligible as if we're conversing face-to-face, a concept we hadn't contemplated before. Our reliance on online platforms was minimal previously. Just yesterday, I engaged in a full-day meeting with DBT, and the week

Stride with Saumitra

prior, I participated in a three-day selection committee session in Pune, all from the comfort of my laptop. It's remarkable how technology enables such seamless interactions. Moreover, in the realm of science, there's been a significant shift in focus. Previously, TB dominated research endeavors, but now, COVID-19 has captured the attention of scientists across disciplines. From physicists to chemists, the collective effort to understand this single organism has presented an immense research opportunity

- **Favourite place in Kalyani/NIBMG**

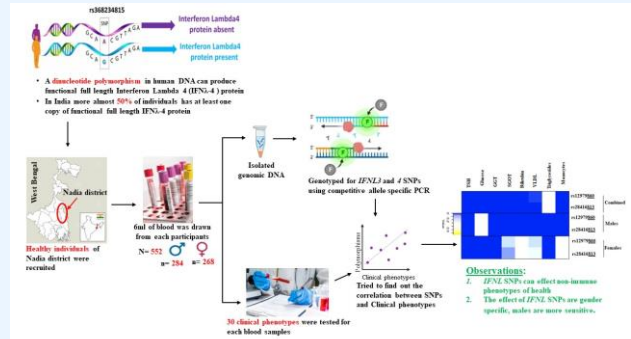
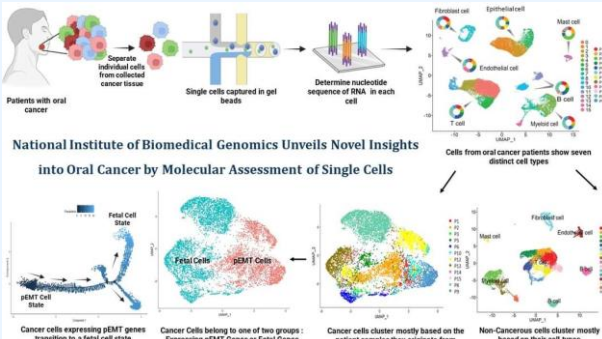
Certainly, within NIBMG, the ambiance and surroundings hold a special charm for me. The lush greenery and the serene campus contribute to its appeal. Occasionally, I ventured into Kalyani, albeit not frequently enough to recall specific names. There's a temple and some shops that I remember visiting, even during the lockdown period. With the requisite government ID, access was granted, allowing me to explore the area.

While not particularly scenic beauty, there was a certain charm to the surroundings, particularly the Kulia lake was very close to my heart! Additionally, I ventured to Ambika Kalna, a place a little farther away, known for its multitude of Shiv temples. The sheer number, 108 Shiv Mandir in total, was a pleasant surprise.

- **Most important quality of a leader**

The essence of leadership lies in leading by example, setting the bar high for others to follow. Just as scoring a century in cricket motivates the team, your performance sets the tone for others. It's not just about individual achievement; it's about bringing people together. A leader must listen to others and foster a democratic environment, where everyone's voice is heard and valued. A dictatorial approach seldom leads to effective leadership. Instead, it's about persuading and convincing others to join you on the journey. However, it's equally important to acknowledge failures and mistakes. Embracing accountability is a hallmark of great leadership and paves the way for growth and improvement.





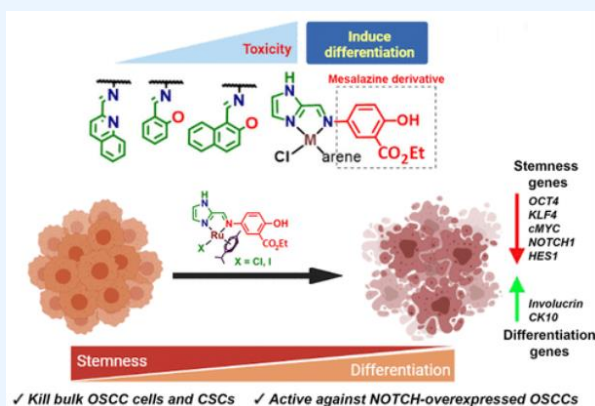
Single-cell transcriptomic analysis of gingivo-buccal oral cancer reveals two dominant cellular programs, Kurkalang S, Cancer Sci. doi: 10.1111/cas.15979

Oral squamous cell carcinoma of the gingivo-buccal region (OSCC-GB) is associated with poor prognosis and high mortality. A single-cell RNA sequencing study from Prof. Arindam Maitra's lab shows that tumors derived from the oral cavity of OSCC-GB patients display significant heterogeneity of cell types and gene expression patterns within the tumor. This may account for the clinical heterogeneity and variable response to treatment. They found two dominant cellular programs namely, partial epithelial-mesenchymal transition and fetal cellular reprogramming in OSCC-GB with distinct differences between patients with or without oral submucous fibrosis. The study elucidates novel cell states and transitions within the tumor ecosystem. The diverse cell types, with distinct genomic, epigenomic, and phenotypic features, can have a significant impact on tumor initiation and progression, which ultimately determines the treatment outcome and overall patient survival.

Gender-dependent multiple cross-phenotype association of interferon lambda genetic variants with peripheral blood profiles in healthy individuals. Roy DG et al., Mol Genet Genomic Med. doi: 10.1002/mgg3.2292.

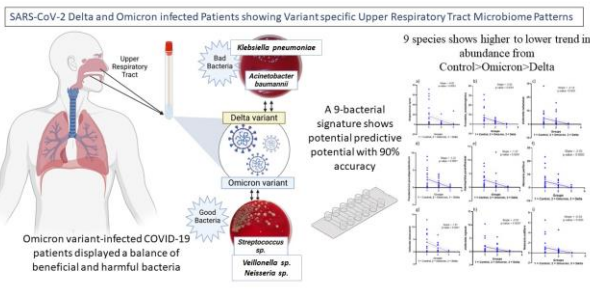
Type III interferons, more importantly IFN- λ 3 and IFN- λ 4 were studied in the context of HCV but recently, there have been reports of associations of this locus in several infectious and inflammatory diseases. Dr. Sreedhar Chinnaswamy and his group published their study on a cohort of 550 local individuals of Nadia district, West Bengal that sheds light on the pleiotropic effect of polymorphisms on IFNL3 and IFNL4 based on several general health phenotypes. Interestingly, when they stratified the cohort based on gender, they found a significant association with monocyte percent and SGOT in males using a dominant model and uric acid using a recessive model. They also found a significant association in groups segregated based on different copy numbers of active IFN- λ 4, with monocyte percent, triglycerides, VLDL, ALP and uric acid levels only in males. The study highlights the gender-specific role of IFN- λ 4 and sends the message to investigate the pleiotropic role of interferons in human health and disease with a gender-specific lens.

In Public Eye



Cytotoxic Imidazolyl-Mesalazine Ester-Based Ru(II) Complexes Reduce Expression of Stemness Genes and Induce Differentiation of Oral Squamous Cell Carcinoma.
 Kumari P et al., *J Med Chem.*
 doi: 10.1021/acs.jmedchem.3c01092.

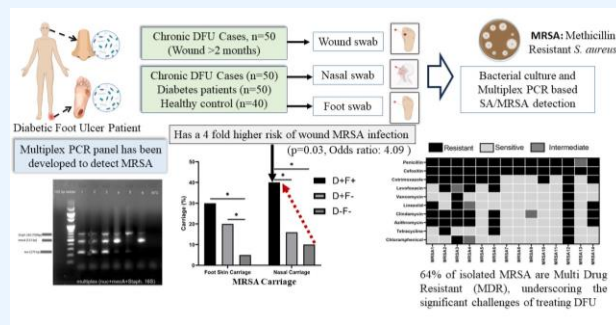
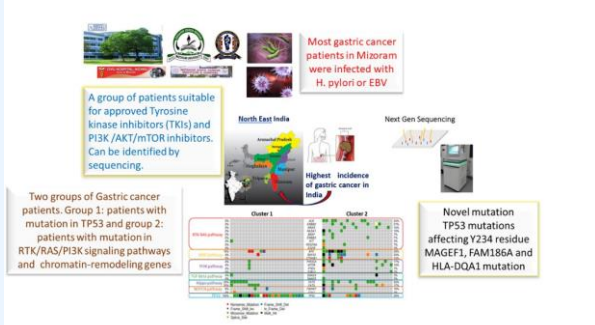
Cancer stemness in Oral Squamous Cell Carcinoma (OSCC) is related to cancer aggressiveness and recurrence. In their strive against stemness in OSCC, Dr. Sandeep Singh in collaboration with Prof. Arindam Mukherjee from Indian Institute of Science Education and Research Kolkata screened novel Ruthenium or Iridium complexes with mesalazine or 3-aminobenzoate Schiff bases. They found complexes that are active against Cancer Stem Cells (CSCs) in cancer patients. The work shows that imidazolyl-mesalazine ester-based Ruthenium complexes can inhibit growth of CSC-enriched OSCC 3D spheroids by reducing the expression of genes related to stemness and inducing the expression of differentiation markers.



Upper respiratory tract microbiome profiles in SARS-CoV-2 Delta and Omicron infected patients exhibit variant specific patterns and robust prediction of disease groups. Nath S et al., *Microbiol Spectr.*
 doi: 10.1128/spectrum.02368-23.

The SARS-CoV-2 virus variant affected individuals differently, as did the newer variants. Dr. Souvik Mukherjee's team, and collaborators studied the Upper Respiratory Tract microbiome profiles in patients infected with the delta or the omicron variants of the SARS-CoV-2. They found a higher inter-individual diversity and a lower intra-individual diversity in patients compared to the control group. They also reported enrichment of a few commensals in the healthy group compared to patients. Additionally, the Ct value in patients positively correlated with *Streptococcus symci* and *Streptococcus toyakuensis* suggesting an inverse effect on viral load. They also found an interesting trend where some 'control-associated' bacteria had a higher to lower trend in the groups (control > Omicron > Delta). This study is important since it helps to understand/ predict lung health using microbiome and design nasal probiotic-based therapies in future.

In Public Eye



Deep sequencing reveals recurrent somatic mutations and distinct molecular subgroups in gastric cancer in Mizo population, North East India. Chakraborty P et al., Genomics.

doi: 10.1016/j.ygeno.2023.110741

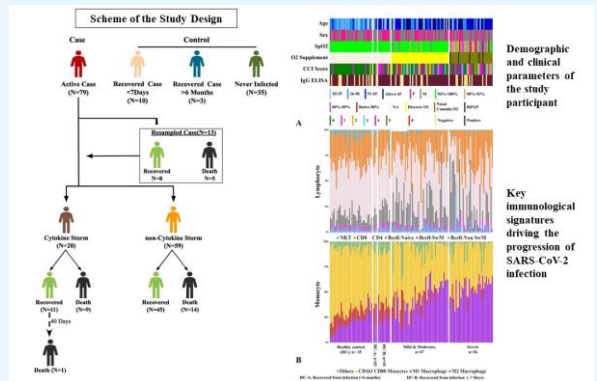
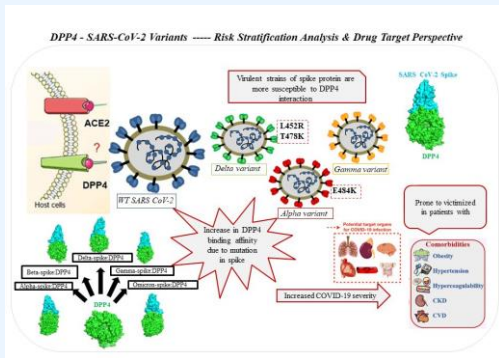
In India, Mizoram has the highest rate of gastric cancer (GC), which may be brought on by environmental factors such diet, infections with the Epstein-Barr virus (EBV) and *Helicobacter pylori* (*H. pylori*), and somatic genetic changes. In this study from Prof. Arindam Maitra's lab, they found that 87% of GC patients had either an EBV or *H. pylori* infection. Only 16% of pathogenic infections were coinfections; the majority were mutually exclusive. There were notable mutations in genes such as TP53, MUC6, and ARID1A. Thus, the research demonstrated the existence of two molecular subgroups with unique mutational profiles among GC patients in the Mizo population: (i) patients with activating mutations in the RTK signalling pathway genes and inactivating mutation of the chromatin-remodeling genes and (ii) patients with TP53 mutations. Thus, GC development and progression in Mizo patients may be driven by EBV and *H. pylori* infections as well as somatic mutations in the genes involved in chromatin-remodeling, TP53, and the RTK/RAS/PI3K signalling pathway.

Nasal MRSA carriage is a risk factor for development of antibiotic resistance in diabetic foot ulcers and is significantly higher than diabetic and non-diabetic individuals without foot ulcer. Mukherjee P et al., BMC Infect Dis.

doi: 10.1186/s12879-023-08673-3.

Diabetes is a chronic metabolic disease, that impairs the immune system of the patients. Diabetic foot ulcer (DFU) is a major complication seen in diabetic patients. Dr. Souvik Mukherjee and his team at NIBMG, in a collaboration with IPGMR, Kolkata, have shown that DFU patients having high nasal *S. aureus* (SA) and/or methicillin resistant *Staphylococcus aureus* (MRSA) are at a higher risk of developing SA and/or MRSA infections in their foot ulcer wounds. The condition worsens because of the immunocompromised state of the patient, that results in antibiotic resistance, making the wound difficult to heal. They have also developed a rapid multiplex PCR based detection system for an easy SA/MRSA identification in clinical environment. Their study provides novel insight on the reduction in antibiotic resistance in DFU wounds by management of nasal MRSA carriage in the patients.

In Public Eye



Unraveling DPP4 Receptor Interactions with SARS-CoV-2 Variants and MERS-CoV: Insights into Pulmonary Disorders via Immunoinformatics and Molecular Dynamics, Roy AN et al., Viruses. doi: 10.3390/v15102056.

It is known that along with angiotensin receptor 2 (ACE2), dipeptidyl peptidase 4 (DPP4) may act as a potential co-receptor aiding the entry of corona viruses such as MERS-CoV and SARS-CoV-2; it is also associated with disease severity. Dr. Pongali B. Raghavendra and his group investigated the interaction of the receptor binding domain (RBD) of different SARS-CoV-2 spike protein variants and DPP4, using molecular docking and simulation studies. They also compared it with the interactions of the experimentally determined MERS-CoV:DPP4 complex. They found that the SARS-CoV-2:DPP4 showed a binding affinity comparative to MERS-CoV:DPP4. The spike variants L452R and T478K in the delta variant of SARS-CoV-2 showed a direct role in DPP4 interaction and enhanced the binding affinity. They also found that the E484K mutation in gamma and alpha variants showed interaction with DPP4. This study would help in understanding the viral entry mediated by DPP4 and potentially target it to manage COVID or other infections.

Multi-faceted dysregulated immune response for COVID-19 infection explaining clinical heterogeneity. Paine SK et al., Cytokine, doi: 10.1016/j.cyto.2023.156434

Coronavirus disease 2019 (COVID-19), caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), involves viral damage to target immune cells, resulting in the dysregulation of immune response in patients. Prof. Analabha Basu and his team at NIBMG tried to understand the interplay of innate and adaptive immune cells during SARS-CoV-2 infection, with special emphasis on macrophage polarization and its function. The study shows that antigen-presenting cell (APC) like M1 macrophage (M1 ϕ) in COVID-19 patients become exhausted during the active phase of the infection, leading to adverse prognosis. Alterations in immune cells, such as activation of T-cell specific repressors and down-regulation of pro-inflammatory activators are associated with immunosuppression, immune exhaustion, and cytokine storms (CS) in COVID-19 patients. Additionally, they have also tried to identify possible biomarkers for adverse prognosis, survival, or the persistent signs and symptoms post SARS-CoV-2 infection.

In Public Eye

Genomic associations with antibody response to an oral cholera vaccine. Roy VL et al., Vaccine. doi: 10.1016/j.vaccine.2023.09.016

Cholera is a food and water borne disease, that has been the longest ongoing pandemic. The oral cholera vaccine is an important measure, that has been undertaken to prevent the spread of the disease. However, heterogeneity in the antibody response to cholera vaccine has been observed in individuals with different blood groups, residing in different geographical regions. Prof. Partha Pratim Majumdar undertook the first global genome wide association study (GWAS) on antibody response to the cholera vaccine and identified three clusters of bi-allelic SNPs related with antibody response. SNPs associated with these clusters have been implicated in immune cell function and immunological aspects of autoimmune or infectious diseases.

Review:

Genome-wide CRISPR screens and their applications in infectious disease. Srivastava K et al., Front Genome Ed. doi: 10.3389/fgeed.2023.1243731.

Dr. Bhaswati Pandit and her group published a review article on Genome-Wide CRISPR screens, highlighting its importance in genomic and biomedical research, with a focus on its application in identifying and investigating host factors in infectious diseases.

p53 and RNA viruses: The tug of war. Pal A et al., Wiley Interdiscip Rev RNA. doi: 10.1002/wrna.1826

Prof. Saumitra Das and his team reviewed the possible mechanisms, using which positive strand RNA viruses modulate the p53 functions at gene, RNA and protein levels that lead to fatal viral infections.

Collaborative studies:

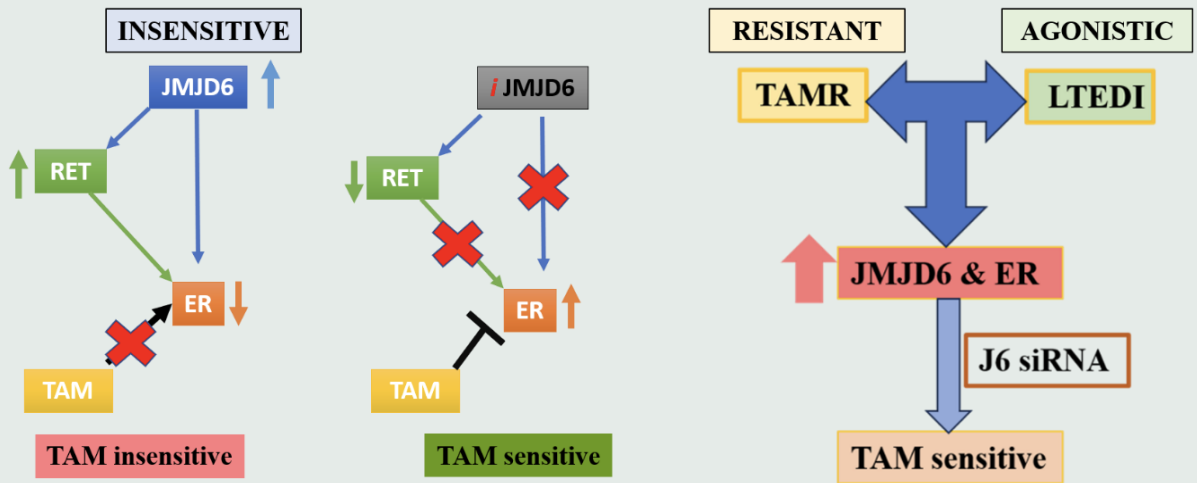
Identification of a Novel Homozygous Missense Mutation in the CLDN16 Gene to Decipher the Ambiguous Clinical Presentation Associated with Autosomal Dominant Hypocalcaemia and Familial Hypomagnesemia with Hypercalciuria and Nephrocalcinosis in an Indian Family. Thapa R et. Al., Calcif Tissue Int. doi: 10.1007/s00223-023-01142-8.

Prof. Anupam Basu, in a collaborative study, tried to understand Familial hypomagnesemia with hypercalciuria and nephrocalcinosis type 1 (FHNNC type 1). Through exome sequencing, his report shows a novel homozygous missense mutation in the CLDN-16 gene, which can help in genetic diagnosis and management of FHNNC.

Research Spotlight

- Partha Das, PI- Prof. Kartiki V. Desai

High expression of JMJD6 mediates endocrine therapy resistance in ER-positive tumors



High expression of JMJD6 mediates endocrine therapy resistance in ER-positive tumors. Breast cancer (BrCa) is the most common cancer in women and 70% is estrogen receptor-positive (ER+). Tamoxifen is the most successful and widely used endocrine therapy for these patients. Despite this, 40% of women become non-responsive to endocrine therapy and have poor survival. High expression of Jumonji Domain Containing protein 6 (JMJD6) is associated with poor prognosis in breast cancer patients. It is an epigenetic regulator, that induces cell proliferation and migration. JMJD6-derived gene expression patterns are significantly similar to tamoxifen-resistant cells and xenografts. We therefore hypothesized that high JMJD6 may contribute to Tamoxifen insensitivity in ER+ tumors and studied the mechanisms involved. Our results show that JMJD6 orchestrated a transcriptional program such that it suppressed ER and highjacked E2-ER axis to induce proliferation. In addition, it increased Rearrange during transfection (RET), ERK1, and p-ERK1 which are known markers of endocrine therapy resistance. In Tamoxifen-resistant model systems, depletion of JMJD6 restored sensitivity to tamoxifen. My research suggests that JMJD6 expression levels may be a useful marker of endocrine therapy resistance and JMJD6 inhibitors may be a viable treatment option for these women.

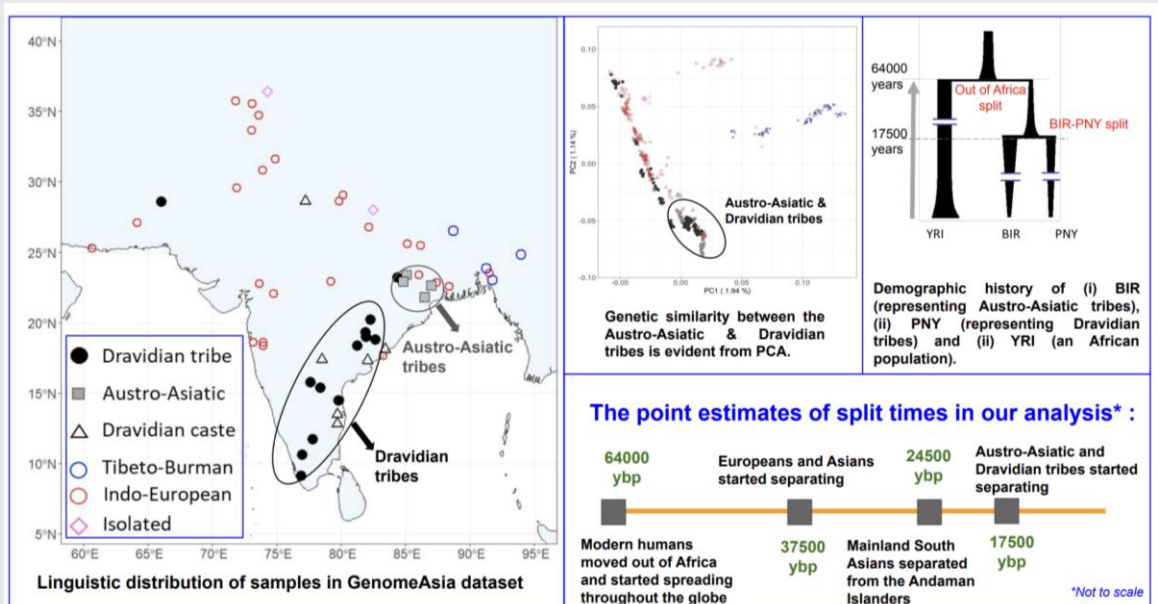
Research Spotlight

- Arghya Dey, PI- Prof. Analabha Basu

In search of the origins of Austro-Asiatic and Dravidian tribal populations of South Asia

The population history of South Asia is complex. This region has rich ethnic, linguistic and genetic diversity. The mainland South Asians communicate using languages that belong to mainly four linguistic families: Indo-European, Dravidian, Austro-Asiatic and Tibeto-Burman. They are further subdivided into two social categories: castes and tribes. Most of the populations of mainland South Asia are admixed, i.e. they were formed by a mixture of multiple ancestral populations. However, some populations have remained isolated for long duration and hence relatively unadmixed. These populations are mostly tribal, and they speak languages belonging to the Dravidian or Austro-Asiatic linguistic families.

Studies of human origin in South Asia, including genetic studies, have suggested that ancestors to these tribal populations were the earliest settlers of South Asia. There is strong evidence that although these populations have relatively small census sizes today, they were once widespread in this region. We are interested in understanding the genetic history of these populations, which might explain the earliest peopling of South Asia. We have shown that these populations have high genetic similarity amongst themselves, relative to other South Asian populations, due to their recent common ancestry. Our analysis suggests that these populations started separating from each other around 16000-20000 years before present, prior to the neolithic revolution



Conference Chronicles

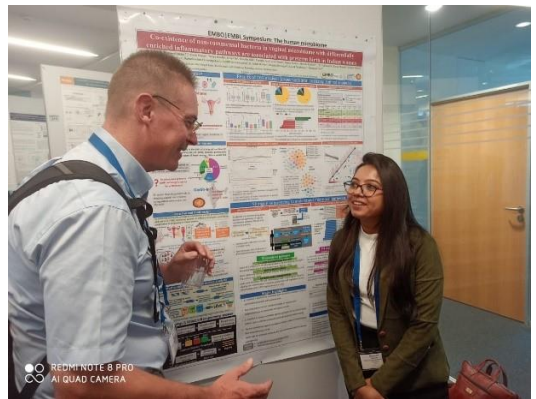
My experience after attending the EMBO| EMBL Symposium: The human microbiome

Venue: EMBL (European Molecular Biology Laboratory) at Heidelberg, Germany

Date of the event: 20-09-2023 to 23-09-2023

Name of the attendee: Mousumi Sarkar, UGC SRF (PI-Dr. Souvik Mukherjee)

It was a great experience for me to attend such a big symposium on human microbiome with my mentor Dr. Souvik Mukherjee, held at ATC building of European Molecular Biology Laboratory (EMBL). At the first sight, my attention is drawn to the stunning campus landscapes and the helical shape of the ATC building right away. During the event, I found every scientific session was incredibly fascinating, which even more amazed me. The only presentation from India was delivered by my mentor, which obtained huge attention and appreciation by the audience. I was so overwhelmed to present my research work titled ***“Co-existence of non-commensal bacteria in vaginal microbiome with differentially enriched inflammatory pathways are associated with preterm birth in Indian women”***,



In front of the renowned scientists like Prof. Rob Knight, Dr. Nicola Segata and others from the microbiome field. The suggestions provided by the experts will enhance my scientific thoughts extensively. From the symposium, I learnt about the cutting-edge techniques and integrative approaches being used in microbiome research currently. Engaging with scientists from diverse institutions allowed me for an insightful discussions and valuable networking opportunities. The symposium covered the extensive ongoing global research on the human microbiome and its translational implications for human wellbeing. Exploring the latest findings evolving in the field of human microbiome research, sharing my own work, and connecting with fellow researchers has not only expanded my knowledge but also inspired me towards the future directions for my research.

Events, Outreach and Awards

Events

Swachhata Abhiyaan



To commemorate the birth anniversary of the **Father of the Nation**, on 2nd October, we took a concerted effort to enhance the cleanliness of our surroundings and collectively take the Swachhata pledge.



Outreach



We also got a chance to showcase our work at **GlobalBio India 2023** held at Pragati Maidan, New Delhi.

Events, Outreach and Awards

Outreach

Inspiring Young Minds



In line with our commitment to outreach, we organized an outreach as a part of India International Science Fair.



We welcome students from **Kalyani Mahavidalaya**. We had pleasure of hosting talk by Dr. Samit Guha, Assistant Professor, **Jadavpur University**, and a representative of VIBHA.



Talk Series and Seminar



We were honored to host a captivating lecture on mechanisms of DNA damage and repairs delivered by **Dr. Benu Brata Das**, Professor, IACS.

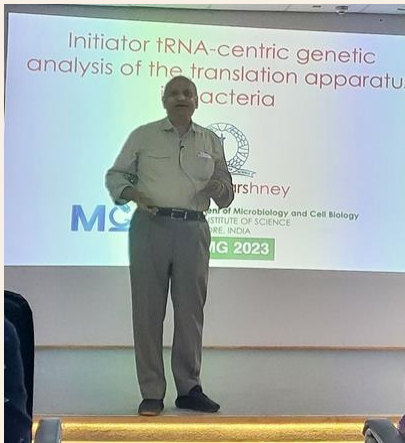
Events, Outreach and Awards

NIBMG Colloquium Series

Words of Wisdom

In the ongoing trajectory of our esteemed colloquium series, we were honored to host the presence of

- **Prof. Umesh Varshney, IISc Bangalore**
- **Dr (Prof.) Vaskar Saha, Consultant & Director- Tata Translational Cancer Research Centre**
- **Prof. V. Nagaraj, IISc Bangalore**

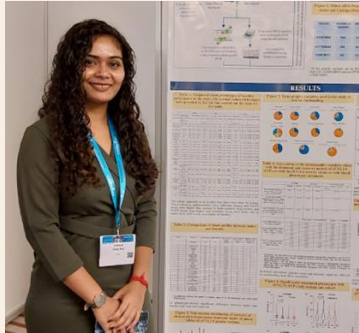


Events, Outreach and Awards

Awards

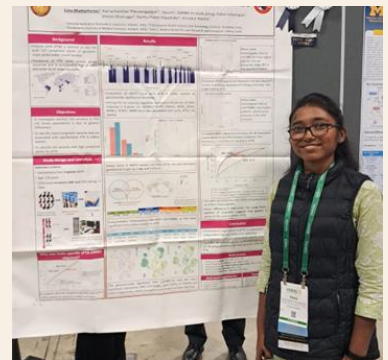


Mr. Arnab Ghosh (PI: Dr Nidhan K Biswas) received the Best Flash Talk award from the G2MC2023 conference held at Campus Biotech, Geneva, Switzerland from 2nd-4th October 2023. He received travel award from Global Genomic Medicine Collaborative and Science and Engineering Research Board - SERB ITS.

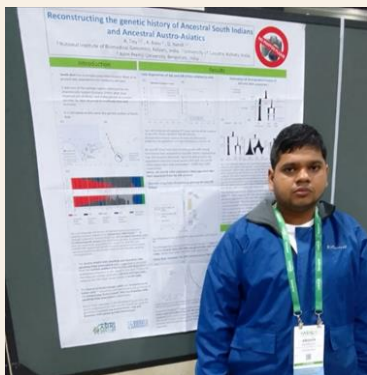


Ms. Debarati Guha Roy (PI: Dr. Sreedhar Chinnaswamy) presented a poster at the Cytokines 2023: 11th Annual Meeting of International Cytokine and Interferon Society at Athens, Greece on 16th October 2023. She received international travel grant from Indian Council of Medical Research

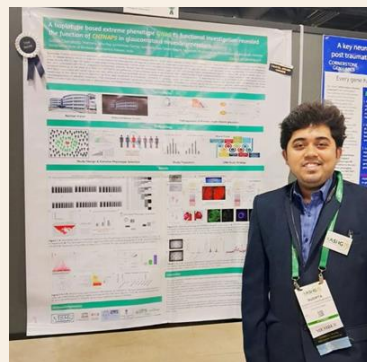
Meeting of the ASHG - American Society of Human Genetics held in Washington DC, USA from November 1-5, 2023. he received "Resource Limited Country Award" from the American Society of Human Genetics to attend and present at the conference.



Ms. Esha Bhattacharjee (PI: Prof. Arindam Maitra) presented her work at the 2023 Annual meeting of ASHG - American Society of Human Genetics held in Washington DC, USA from Nov 1-5. She had received "Resource Limited Country Award" ASHG which supported her to attend and present at the conference. The abstract also received "Reviewer's Choice" designation for being in the top 10% scored poster abstracts.



Mr. Arghya Dey (PI: Dr. Analabha Basu) attended the ASHG - American Society of Human Genetics 2023 from November 1-5, 2023, at Washington DC, USA. He received travel award from the Indian Council of Medical Research.



Mr. Sudipta Chakraborty (PI: Dr. Moulinath Acharya) presented his work at the 75th Annual

Creative Corner

HOME

-Anweshya Panda

I get an evocative image reminiscing about the
occupants and their stay,
Each one is different and inimitable in its own way.
I am the place where they start new chapters of their
life.
I notice them creating memories, laughing their hearts
out
And even crying themselves to sleep and that is how
they survive.
Witnessed innumerable embraces, kisses and other
gestures of love.
Seen the lady working all day and even at the nights.
The pets wagging their tails and waiting at the door,
The babies running and hugging their dads when they're
back from work.
I watch the siblings reconciling, after their grisly and
gruesome fights.
Observed the members heavy-hearted after a
squabble,
But expeditiously sticking up for each other, in trouble.
They grow up wanting to leave me, to live and learn
Tired after chasing their dreams, they grow old craving
to return.
And when they do, they realise that nothing has
changed,
The same old smell of familiarity and nothing feels
strange.
The old, tired soul is finally filled with comfort and finds
its peace.



-Anjali Gupta



-Jyotishman Sarma



-Partha Das

Meet The Team

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