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Meet Early Career Researcher - Ismath Sadhir - Awardee of the *Molecular Microbiology* Poster Prize at the EMBO Workshop Bacterial morphogenesis, survival and virulence: Dynamic genomes & envelopes 06 – 10 February 2023 | Goa, India

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Could you briefly introduce yourself for our readers, tell us who you are and what do you do?

My name is Ismath Sadhir. I am from Kerala, India. I completed my undergraduate and masters studies at the Indian Institute of Science, Bangalore. Currently, I am a final year PhD student at the Max Planck Institute for Terrestrial Microbiology, Marburg.

Could you discuss with us your work and summarize the main findings of your project presented during the latest edition of the EMBO Workshop Bacterial morphogenesis, survival and virulence and explain why it is relevant to our field?

In my project, I investigated how the terminus region of the *E. coli* chromosome is organized during the cell cycle. For this study, we employed a high-throughput, single-cell imaging and analysis pipeline that involved the use of microfluidics devices known as 'mother machines'. Using mother machine, I was able to image and track thousands of cell cycles from birth to division. Through quantitative image analysis, we identified an unknown coupling between the segregation of the origin region and the terminus region of the *E. coli* chromosome. Interestingly, one of our key findings was that the segregation of the origin is not a prerequisite for the segregation of the rest of the chromosome. This finding is significant because, although the origin of replication is the first part of the chromosome to be replicated and segregated, one might assume it to be the primary driver of chromosome segregation. However, our results suggest that this is not necessarily the case.

Can you tell us more about the genesis and the story behind this scientific project?

The terminus region of the bacterial chromosome is the last part to be replicated and segregated. Unlike other chromosomal loci, it exhibits unique dynamics throughout the cell cycle. We were interested in understanding the factors that enable these dynamics by tracking the behaviour of the terminus during the cell cycle.

Did you encounter any challenges in this study? If yes, can you tell us more about that?

Just like any other PhD project, I had my fair share of challenges. One of the initial hurdles was setting up the microfluidics system. Thankfully, I had support from my department colleague, Dr. Eugen Kaganovitch, which was instrumental in getting started. Subsequently, it required a great deal of trial and error from my side to identify the optimal imaging conditions for continuously imaging bacteria over several days. Many of the existing protocols were only intended for short-term imaging, so I had to troubleshoot many problems specific to continuous, long-term imaging.

The second challenge involved image analysis. Coming from an experimental microbiology background, I had no prior experience with quantitative image analysis. I am grateful to my colleagues, especially Robin Köhler, and my advisor, Dr. Sean Murray, for designing the image analysis platform and guiding me in taking the first steps into programming and quantitative image analysis.

On the other hand, is there any fun fact about this scientific journey that you would like to share with us?

I started as an experimental biologist, and my PhD journey has transformed me into more of a computational biologist. It's interesting as I've mostly heard stories going the opposite way.

Can you tell us what are your long-term career goals and maybe explain what will be the next step for you in your career?

I am nearing the completion of my PhD. During my final year, I was able to establish collaborations that capitalized on my expertise in imaging bacteria using the mother machine. I am enthusiastic about continuing this line of research and establishing pipelines to study various spatiotemporal dynamics in bacteria. However, these plans are contingent on available opportunities and funding. Alternatively, I am interested in science management and if a research path doesn't materialize, that is where I aim to direct my career.

Similarly, is there a story behind a well-known scientific discovery that impresses or fascinates you and you would like to share with us?

Yes. That would be the discovery of the structure of DNA, especially the contribution of Dr. Rosalind Franklin. Despite facing limited resources and recognition, Dr. Franklin tenaciously worked to elucidate DNA's structure and produced Photo 51, a pivotal piece of evidence that was crucial to understanding the double helix structure of DNA. Her life story, marked by persistent effort and resilience, continues to inspire me to persevere in my own work.

Finally, any tips for PhD students and/or Junior Post-Docs to be awarded best poster?!

Firstly, understand your audience and craft an accurate, catchy title to attract them. Design your poster with a logical flow, clarity, and visual appeal to cater to viewers of different expertise levels. Instead of displaying all results, focus on crucial findings that narrate your research story effectively. Use jargon-free language and highlight the key takeaways of your work.

Prepare to succinctly present each section and anticipate possible questions. Engage with attendees to generate meaningful discussions, and afterward, seek feedback for future improvements. Remember, a poster presentation is not only about showcasing research but also building valuable connections.