First person – Mohammed Aamir Sadiq and Ananda Shikhara Bhat

First Person is a series of interviews with the first authors of a selection of papers published in Biology Open, helping researchers promote themselves alongside their papers. Mohammed Aamir Sadiq and Ananda Shikhara Bhat are first authors on 'Spatial structure could explain the maintenance of alternative reproductive tactics in tree cricket males', published in Bio. Mohammed Aamir conducted the research described in this article while an undergraduate/master’s student in Prof. Rohini Balakrishnan’s lab at the Centre for Ecological Sciences, Indian Institute of Science, Bangalore, India. He is now a PhD student in the lab of Prof. Rohini Balakrishnan.

Describe your scientific journey and your current research focus

M.A.S.: I come with a background in ecology and evolutionary biology. During my undergraduate years, I worked on understanding the behavioural changes that are associated with the evolution of dispersal. I also worked on projects aimed at understanding how resource distribution affects clan architecture in the Asian elephant. Currently, my focus is to understand the mechanisms by which alternative reproductive tactics (ARTs) evolve and are maintained in populations under different ecological contexts. I employ empirical, data-analytical and simulation-based approaches to answer these questions.

A.S.B.: I recently completed an integrated BS-MS degree from the Indian Institute of Science Education and Research (IISER) in Pune, India. My first scientific work was on frog bioacoustics, with fieldwork in the Western Ghats rainforests of India. I later grew more interested in modelling, and that fascination led to the Oecanthus henryi paper that is the focus of this interview. For my master’s dissertation, I worked on more abstract mathematical models of the consequences of stochasticity on evolution in small populations. I am currently a PhD student in Prof. Hanna Kokko’s group in Germany, where I continue to use mathematical and computational tools to study eco-evolutionary questions. I am currently most interested in modelling the evolution of aging.

Who or what inspired you to become a scientist?

M.A.S.: It was the bi-monthly birding sessions in the city of Bengaluru during my childhood that inspired me to become an ecologist.

A.S.B.: I grew up in the extremely biodiverse Western Ghats rainforests of India and had an early interest in wildlife and nature as a result. Both my parents were extremely encouraging and helped nurture and develop this interest as a child. My parents always encouraged me to stay curious and ask questions. They also completely indulged my interests at every stage. For instance, when I developed an interest in insects as a child, my parents helped me keep various insects at home and encouraged me to document their behaviour systematically and search books and the internet myself to find answers to any questions I may have about these ‘pets’. They were also more than willing to let me attend various local wildlife related programs to learn about snakes, birds, insects, and other wildlife. I would say it was this encouraging, nurturing environment that encouraged me to try and answer curiosity-driven questions about animals for a living.

How would you explain the main finding of your paper?

Anyone who’s spent a night in the countryside knows that male crickets emit acoustic calls at night to attract females. In some species of tree crickets, males can also make a pear-shaped hole called a ‘baffle’ on a leaf and call through the leaf. ‘Baffling’ in this manner makes the sounds these crickets emit much louder, thus rendering them audible to more females and females from further away, potentially increasing their chances of finding a mate. Naively, if baffling is always better for attracting mates, natural selection should ensure that every male in the species makes and uses a baffle. Puzzlingly, in O. henryi, a species of tree cricket in India, many males in the field do not make and use baffles despite being able to do so. Even more perplexingly, some males do not emit any calls at all,
instead electing to remain silent for the duration of the night. What may explain this apparent contradiction? Using simulations that build upon decades of empirical data from field and laboratory experiments, we show in our study that the spatial distribution of the host plants on which the crickets live limits the success of baffling males and equalises the mating success of males that baffle, males that call without baffling, and males that remain silent.

Males who baffle cannot move from one bush to another, since they have committed to a single baffle and use it for the rest of the night. On the other hand, males that call without using baffles, as well as males that remain silent, are free to move from one bush to another throughout the night. We also show in our work that this difference in movement ability plays a crucial role in equalizing the mating success of baffling, calling (without baffling), and silent males: If no males are allowed to move in our simulations, baffling once again becomes the most successful strategy to attract females. Our findings could explain why these diverse mating strategies can coexist in *O. henryi*.

**What are the potential implications of this finding for your field of research?**

Organisms of many different species can choose between many alternative ways to obtain mates. Explaining how such ARTs can coexist within a single species is an important area of research in behavioural ecology. Our work highlights how physical space can play an important role in determining the success of different ARTs. In particular, our study shows how ecological details about how habitats are structured and how organisms move can strongly affect the mating success of different ARTs. More generally, our study illustrates the power of integrative approaches that combine the power of simulations with the insights gained from meticulously conducted field observations and laboratory experiments.

**Which part of this research project was the most rewarding?**

This project was the result of a close collaboration between two researchers who engage primarily in theoretical/modelling work (Shikhara and Vishwesha Guttal) and two researchers who engage primarily in empirical work (Aamir and Rohini Balakrishnan). As a result, we got to see how very different skillsets and knowledge bases could come together to create breakthroughs. The most rewarding part of this experience, in our opinion, was seeing the general simulation model take shape from decades of empirical knowledge collected by Rohini’s group as a result of this collaboration.

**What do you enjoy most about being an early-career researcher?**

**M.A.S.:** Being an early-career (ECR) researcher for me brings a lot of freedom to be able to develop and execute projects that really interest me.

**A.S.B.:** I find the intellectual freedom that comes with being an ECR very rewarding. I have had the privilege of working in research groups that have given me free reign to explore whatever topics interest me and tinker around with all sorts of ideas. I am very grateful for this because I value having the time and the ability to explore and develop projects in whichever directions interest me. More generally, as an ECR, I can focus mostly on my science without having to immediately worry about ‘grown up’ responsibilities such as applying for research grants or being on hiring committees.

**What piece of advice would you give to the next generation of researchers?**

**M.A.S.:** While I don’t believe that I am in any position to give advice, my two cents to the next generation of researchers would be to remain curious at large and ask questions that really excite you.
A.S.B.: I think the most important thing is to choose a research group and community that is supportive and encouraging. Science can be gruelling, and setbacks, rejections, and challenges are routine. Being part of a vibrant, friendly group works wonders for your mental health and keeps you happy and productive.

What’s next for you?
M.A.S.: I am working to join the government and leverage my expertise in ecology to aid management and conservation of protected areas in India.

A.S.B.: In January 2024, I started a PhD in Prof. Hanna Kokko’s group at the Johannes Gutenberg University in Mainz. I am currently interested in using mathematical models to study how ageing evolves and potentially address why different organisms can have such different lifespans. I eventually want to hold a faculty position at a university and help support the next generation of researchers, especially those who, like us, come from historically underrepresented communities.

Reference