

ECR SPOTLIGHT

ECR Spotlight – Anuradha Batabyal

ECR Spotlight is a series of interviews with early-career authors from a selection of papers published in Journal of Experimental Biology and aims to promote not only the diversity of early-career researchers (ECRs) working in experimental biology during our centenary year, but also the huge variety of animals and physiological systems that are essential for the 'comparative' approach. Anuradha Batabyal is the author of 'Predator–prey systems as models for integrative research in biology: the value of a non-consumptive effects framework', published in JEB. Anuradha conducted the research described in this article while a Postdoctoral Associate in Dr Ken Lukowiak's lab at Hotchkiss Brain Institute, University of Calgary, Canada. She is now an Assistant Professor at FLAME University, India, investigating evolutionary behavioral ecology and cognitive biology.

Describe your scientific journey and your current research focus

I am an Assistant Professor of Environmental Sciences at FLAME University, India. Before this, I was a Postdoctoral Associate in Dr Ken Lukowiak's lab at the University of Calgary for 2.5 years, where I worked at the Hotchkiss Brain Institute studying long-term memory formation, memory enhancement and learning under various stressful conditions such as extreme temperature, chemical pollutants and invasive predatory threats in pond snails (*Lymnaea stagnalis*). The most interesting idea that I pursued was to investigate how 'instinct' is formed and it is still a work in progress. Even though snails are tiny creatures, it is surprising how smart they are. Before moving to Canada, during a short postdoc in India, I diversified to work on humans and explored links between physiological and psychological stress in undergraduate students at an Indian university. For my PhD, from the Indian Institute of Science (IISc), India, I studied the shifts in phenotypic traits of the Indian rock agama (*Psammodromus dorsalis*) as it adjusted to the urban landscape. I investigated their color change, stress physiology, learning and associated behavioral traits. All this work has produced 35 peer-reviewed research articles in international journals, and I am happy to have reached 35 under 35!

My research interests have always been varied and I am currently wearing multiple hats. In my new job at a liberal arts university, I am trying to balance teaching and research. My students and I are working on understanding how stress, depression, sleep and other lifestyle factors impact learning and cognition. Simultaneously, I am pursuing my life's passion for understanding broad and emergent patterns and links between ecology, stress, cognition and mental well-being. I am equally driven to inspire and mentor a new generation of experimental biologists who will unravel new frontiers in biology or other fields, and I am having great fun working with undergraduates.

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Anuradha Batabyal

How would you explain the main message of your Commentary to a member of the public, and how would you explain the broader impact of research in this area?

While physicists and chemists have theoretical models to understand the world, biologists must work with live organisms that act as models. Over the years, several model organisms have been developed. They have provided great insights into the form and function of life from the molecular to the ecosystem level. However, we are at a stage where the next advances in understanding life lie in integrating knowledge generated in specialized disciplines into a holistic and wide-ranging framework. In this Commentary, I propose an integrative generalized experimental framework based on a ubiquitous eco-evolutionary predator–prey interaction that can be used across multiple disciplines such as ecology, neuroscience and development, etc., to answer some of the most important questions in biology. The insights gained from using this framework can potentially impact research in artificial intelligence, mental wellbeing and biodiversity loss, which are important contemporary challenges.

What do you see as the main value of Review/Commentary-type articles?

Reviews and Commentaries are important aspects of bringing about a change in perspective and innovation in a field. Scientists are often



Me resting after a day's fieldwork in a grassland which is one of the threatened and understudied ecosystems of the world.

focused on specific questions and topics, which can restrict their perspective as to how their questions fit into the larger scheme of things. By collating information and establishing new connections, Reviews and Commentaries bring about a fresh approach to research. This makes scientific research vibrant and colorful. For young researchers and people outside the field, Reviews and Commentaries become the first source to gain knowledge about a novel field or a complex problem. Importantly, they provide a necessary third-person perspective or condense a vast body of research into a compressed version containing the most important aspects and outstanding questions in the field.

What do you think experimental biology will look like 50 years from now?

Although it is very difficult to predict the future of science because of the rapid pace of scientific and technological innovation, history tells us that life's fundamental questions will remain out there to be answered. The state of our planet in the Anthropocene and the

penetration of technology in people's lives will accentuate contemporary issues such as climate change, biodiversity loss, mental health, lifestyle disease, neurodegenerative disorders, longevity and public health, which will take center stage in biological research. However, breakthroughs and innovations to help solve these problems will come from insights gained from fundamental experimental research aided by technological advances. Several fields will advance and answer questions beyond imagination. We may have understood the workings of the brain and the mind, the trade-off between longevity and aging disorders, changes in personality due to urbanization, and rapid evolution. Nonetheless, experimental biology will be super exciting, with numerous opportunities for novel research. It is indeed an exciting time, as technology that was once out of reach is now in the hands of researchers. From portable monitoring devices to ease of DNA sequencing and high-resolution imagery, coupled with unprecedented big data and powerful analytical tools, we are sure to better understand life.

If you had unlimited funding, what question in your research field would you most like to address?

As a researcher from a country with limited scientific funding, I had to be creative and innovative to overcome the financial challenges to bring about discovery. This has taught me that simple and elegantly designed experiments can be powerful in gaining insights into life processes. But importantly, generous funding for science enables more people to participate in the process and accelerates discovery. This is more important than more funding for a limited number of researchers. However, given unlimited funding, I would like to understand how individuality and diversity play a role in stress responses, cognitive ability and adaptation, and how we can maintain maximum variation and individuality in a rapidly changing world. Individuality and diversity of thoughts, perspectives and lifestyles have been the essence of life which is eroding in the increasingly anthropogenic world.

Reference

Batabyal, A. (2023). Predator–prey systems as models for integrative research in biology: the value of a non-consumptive effects framework. *J. Exp. Biol.* **226**, jeb245851. doi:10.1242/jeb.245851