

ECR SPOTLIGHT

ECR Spotlight – Justine Nguyen

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 but also the huge variety of animals and physiological systems that are essential for the ‘comparative’ approach. Justine Nguyen is an author on ‘The buzz within: the role of the gut microbiome in honeybee social behavior’, published in JEB. Justine is a PhD candidate in the lab of Chelsea Cook at Marquette University, investigating how individual physiology scales to ultimately affect social dynamics.

How did you become interested in biology?

My parents frequently took me to the local Brookfield Zoo and Shedd Aquarium when I was a child, and so I fell in love with the creatures that shared our world very early on in my life. Outside of those trips, I spent most of my free time with my nose buried in books about sharks or reptiles or intently watching the Animal Planet channel, with idols like Steve Irwin and Jeff Corwin further cultivating my interests. I became so enamored with marine animals that my answer to the quintessential childhood question of ‘What do you want to be when you grow up?’ was a dolphin trainer! My curiosity and love for animals eventually developed into a passion for biology, but that didn’t happen until my freshman year of high school, where my honors biology class set me on the career trajectory that I’m still on right now.

Describe your scientific journey and your current research focus

I began my foray into scientific research when I became a Women in Science Enabling Research fellow in the summer before my junior year of undergrad. I joined Dr John Kelly’s microbial ecology lab, where I assisted on a project studying the movement of microplastics through streams. Because of my positive contributions to the lab that summer, Dr Kelly gave me the opportunity to develop an independent project headed by my own research interests. Funded by Loyola’s Institute of Environmental Sustainability Fellowship, I studied the interactions between microbial communities and the anti-bacterial compound triclosan on the surface of microplastic fibers in stream water. My work demonstrated that triclosan selects for lower microbial diversity and shifts microbial composition both on the surface of microplastic and in surrounding water columns. My experience as an undergrad enabled me to be accepted into Marquette University’s PhD in Biological Sciences program in Milwaukee, WI, USA, where I am in my fourth year. Although I originally came to Marquette to continue my expertise in microbial ecology, I ventured outside my comfort zone and joined Dr Chelsea Cook’s honeybee behavior lab. Underneath Dr Cook’s enthusiastic mentorship, I quickly gained a newfound excitement for honeybee biology, and I combined it with my



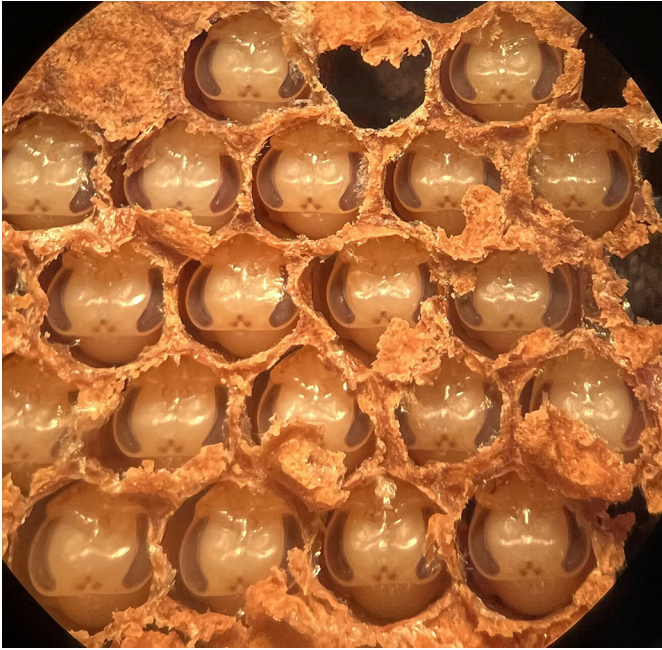
Justine Nguyen

background in microbiology to develop my dissertation. I now study the effects of the gut microbiome on social behavior for my doctoral work.

How would you explain the main findings/message of your paper to a member of the public?

The gut microbiome has been demonstrated to influence animal biology in several ways, and one of those ways is through behavior. Specifically, the gut microbiome, in its digestion of its host’s diet, can produce molecules that can act as signals to the host brain and thus influence the host’s actions. We know from previous research that the perturbation of the gut microbiome disrupts an individual’s ability to be social, but we don’t know the consequences of that disruption beyond just the individual’s health. How does that affect that individual’s ability to communicate with others? Can exposure to gut microbiome disrupting chemicals, like antibiotics, disrupt how a group of animals will behave, if the antibiotics causes animals to feel sick? Honeybees are a great system to answer these questions because they’re highly social insects whose health depends on their smaller, simple gut microbiome, and they display a variety of complex behaviors. But much of the current research has focused on the effect of the gut microbiome on the individual honeybee, with a focus on the oldest and youngest worker types within a colony. We argue for the gut

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A cluster of uncapped honeybee pupa before being extracted for lab experiments.

microbiome field to expand our knowledge of the honeybee gut microbiome to other worker types. We also argue that the use of honeybees as a model organism could be advantageous in exploring the possibility that the gut microbiome influences evolution, since honeybees organize themselves into colonies that are commonly referred to as a ‘superorganism’.

What is the hardest challenge you have faced in the course of your research and how did you overcome it?

Overcoming my imposter syndrome is still the hardest challenge I face every day. I take comfort in that many, many other people share the feeling of ‘you don’t belong in the space you’re in’, and I make it a point to empower and encourage other people when they get stuck in an imposter syndrome rut. Empowering others also helps me empower myself, because I can hear myself telling others that they belong in science, and it’s like I’m telling myself that message too.

Do you have a top tip for others just starting out at your career stage?

Get therapy; not because graduate school is inherently traumatizing (although it can be), but because it will push your personal limits in ways that is best navigated with a professional. I started therapy during my second year of graduate school, and it was the best decision I ever made. It helped me through my imposter syndrome and gave me tools that I use every day to handle the high stress load that comes with being a grad student. Also, intentionally create a network of support that extends beyond your primary mentor and even your university. Once you have that network of support, use it! It is there to help you and support your journey.

What do you like to do in your free time?

I’m an avid video gamer – my favorite games include the Monster Hunter series, Pokémon, Dredge and Dave the Diver. I also recently picked up crocheting as a hobby, which helps me channel nervous energy into something calming.

Reference

Nguyen, J. B., Marshall, C. W. and Cook, C. N. (2024). The buzz within: the role of the gut microbiome in honeybee social behavior. *J. Exp. Biol.* **227**, jeb246400. doi:10.1242/jeb.246400