

## ECR SPOTLIGHT

## ECR Spotlight – Anna Seibel

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. Anna Seibel is an author on 'sexual dimorphism in jump kinematics and choreography in peacock spiders', published in JEB. Anna is a Master's student in the lab of Assoc. Prof. Ajay Narendra at Macquarie University, Australia, investigating visually guided behaviours in jumping spiders.

**How did you become interested in biology?**

Growing up with one of Sydney's largest national parks right outside my doorstep, I spent a lot of time as a kid exploring the outdoors with my siblings. This fostered a keen interest in the natural world and, in particular, a fascination with Australia's native wildlife. Throughout school, I always loved biology and was captivated by learning the exact mechanisms by which body processes work. After high school, I joined a wildlife rescue organisation and, together with my family, raised dozens of orphaned baby possums, gliders, magpies and more. My desire to understand animal biology and the mechanisms that drive specific behaviours drove me to pursue a Bachelor of Biodiversity and Conservation. This has allowed me to combine my interest in watching animals and doing cool science.

**Describe your scientific journey and your current research focus**

My scientific journey began at Macquarie University, where I completed a Bachelor of Biodiversity and Conservation in early 2024. In third year, I took an Invertebrate Biology course taught by Assoc. Prof. Ajay Narendra, which really sparked my interest in invertebrate behaviour. During the summer holidays of 2023–2024, I was awarded a summer internship programme in Ajay's lab to work on a research project studying flight dynamics in Australian native bees. This was my first venture into using high-speed cameras to quantify animal behaviour. I was fascinated with the exceptional detail I could visualise from high-speed footage. Given the number of jumping spiders I have in my own backyard, I was eager to film and study the jump choreography in jumping spiders. I literally 'jumped' at the opportunity to study peacock spiders on the university campus and surrounds, with a focus on determining jump variation between sexes. Working with jumping spiders has proven to be absolutely fascinating and affirmed my interest in pursuing a Master's programme at Macquarie University. My Master's research involves studying navigation and jump kinematics in spiders with different body geometries.



Anna Seibel

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

Peacock spiders are some of the smallest and most charismatic jumping spiders, known for their colourful courtship dances. Not only are they cute but peacock spiders are also exceptional jumpers. Unlike most other animals that use their muscles or a spring-loaded mechanism to jump, peacock spiders jump using a semi-hydraulic system. This means they power their jumps using a combination of hydraulic pressure and muscles. By filming peacock spiders using high-speed cameras, we found that they have the fastest acceleration of any jumping spider (more than twice that of the previous record). Male spiders have faster jump take-off times and steeper jump angles than the females, which were six times as heavy. The heavier females (13.2 mg), in contrast, have slightly higher acceleration than the males (2 mg). During a jump, these tiny peacock spiders experience a *g*-force of 12–13, which is an impressive feat considering F16 pilots endure a *g*-force of 9. Interestingly, both male and female peacock spiders use their third pair of legs to propel the jump, which is the same pair of legs that males wave around during courtship displays. This may mean that males are more vulnerable to predation during courtship.

**Why did you choose JEB to publish your paper?**

A large number of papers I have read about jumping behaviour, comparative biomechanics and visually guided behaviours are those published in Journal of Experimental Biology. I have very much enjoyed the interdisciplinary papers in JEB in the field of neuroethology that bring together different aspects of biology, physics and engineering. My co-authors who had previously published in JEB were impressed by the review process, which contributed to our decision. JEB, being a society journal, has several

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**A time lapse series showing a male Australian splendid peacock spider, *Maratus splendens*, jumping across a 4 cm gap.**

schemes to support young scientists, which I have learnt has benefitted a number of members in our research group and was another reason why we decided to publish our paper in JEB.

#### **What do you enjoy most about research, and why?**

Apart from the fact that I get to spend heaps of time outdoors, the part that I enjoy most about research is the process of observing animals and subsequently developing questions that guide further exploration into aspects of their behaviour or ecology. This is especially fascinating for animals like jumping spiders, where so much about their behaviour in the wild remains unknown. I also

enjoy the challenge of learning new research techniques, from learning to operate high-speed cameras to analysing micro-CT images, I find it incredibly rewarding to work towards mastering new things and expanding my skill set.

#### **What is the most important piece of equipment for your research, what does it do and what question did it help you address?**

The Phantom high-speed camera T1340 is definitely one of the most critical pieces of equipment for our research. This camera, coupled with a macro lens, has allowed us to capture the jumps of tiny jumping spiders that are shown in this paper. As these spider jumps are extremely fast, the Phantom T1340 has enabled us to capture footage at high frame rates (5000 frames s<sup>-1</sup>) and at high resolution, facilitating our investigation of how jump kinematics vary between male and female spiders.

#### **What's next for you?**

Jumping spiders come in a variety of shapes and sizes. I am eager to investigate the influence of body geometry on jump choreography and visual navigation, which is the focus of my Master's research.

#### **Reference**

Narendra, A., Seibel, A., Ramirez-Esquivel, F., Joshi, P., McLean, D. J., Robledo-Ospina, L. and Rao, D. (2025). Sexual dimorphism in jump kinematics and choreography in peacock spiders. *J. Exp. Biol.* **228**, jeb249416. doi:10.1242/jeb.249416