© 2024. Published by The Company of Biologists Ltd | Journal of Experimental Biology (2024) 227, jeb247766. doi:10.1242/jeb.247766

ECR SPOTLIGHT

ECR Spotlight – Chiara Ciccone

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. Chiara Ciccone is an author on 'Circadian coupling of mitochondria in a deep-diving mammal', published in JEB. Chiara is a PhD student in the lab of Shona H. Wood at UiT – The Arctic University of Norway, Tromsø, investigating diving physiology and hypoxia tolerance.

Chiara Ciccone

How did you become interested in biology?

I've always been interested in biology. As a kid, I remember spending time outside with a magnifying glass looking for insects in the grass, and my favorite game was to play with all my small animal figurines. As I grew up, I also started reading my mother's old books on human physiology, which I think had a big role in defining my interest in physiology now. I must admit that even though there were all these signs, the path towards my enrollment in the Biological Science program in Rome was not very smooth. It took me time to understand that being a biologist was what I wanted and what mostly opened my eyes was attending my first zoology course. I realized that there were so many fascinating and interesting creatures around me, and I couldn't wait to learn about them.

Describe your scientific journey and your current research focus

My scientific journey started in Rome while attending the human physiology course in the Biological Science program. I was lucky enough to have a professor whose interest was about not only human but also diving mammals' physiology. He used to fill his lectures with numerous examples from the aquatic world, making me realize how amazing the physiology of these mammals is. From there, I started doing a lot of research about diving mammals and I ended up finding many papers from The Arctic University of Norway, in Tromsø, Norway. I felt so invested and interested while reading these papers that I decided to apply for a master's in Arctic Animal Physiology in Tromsø. There, I started working on hooded seals (*Cystophora cristata*) and harp seals (*Pagophilus groenlandicus*). My master's project focused on brain capillarization and quantified capillary density in diving mammals (hooded seals and harp seals) versus non-diving mammals (reindeer, *Rangifer tarandus*).

Living in a place with such extreme light conditions as Tromsø, one cannot avoid asking how the biological rhythms of arctic species, like the hooded seal, are affected. Therefore, part of my PhD project focuses on circadian rhythms in the hooded seal and the hypoxia–biological clock interaction. The other part of my project focuses on studying mitochondria in the neurons and glia cells of the hooded seal brain, trying to investigate hypoxia-induced cell-specific adaptations.

Chiara Ciccone's contact details: UiT – The Arctic University of Norway, Tromsø NO-9037, Norway.
E-mail: chiara.ciccone@uit.no

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

Every animal lives in a continuously changing environment, and to survive, it is important for them to adjust to these changes. Most animals possess an internal biological clock, which allows them to anticipate and adapt to those changes. Hooded seal diving behavior is known to have daily variations, with longer and deeper dives during the day, when its preferred prey are also found at deeper depths, and shallower and shorter dives at night. The biggest challenge of diving is having to deal with the absence of oxygen (hypoxia), which can be more severe during the longest dives. Oxygen has indeed a very important physiological role since it is fundamental for cellular energy production in the mitochondria. Given the daily variations in diving duration and depth, it is then important for the hooded seal to accurately time how the oxygen is used by the mitochondria. In this paper, we show that the hooded seal possesses a functional molecular clock that is regulating mitochondrial activity throughout the day. The result of this regulation is a more efficient use of oxygen, which, in the end, will maximize the time a seal can spend underwater when it is needed the most, like during the day while hunting for prey.

What do you enjoy most about research, and why?

I really enjoyed my fieldwork. We used to sail from Tromsø all the way to the pack ice of the Greenland Sea and stay there for a couple of weeks in late March, during the hooded seal breeding season. I think that being able to see hooded seals and harp seals so up close in their own environment was really a gift. During our last expedition we also got to see two polar bears, and the feeling I had in that moment is something I will never forget. Even though I have been there multiple times, it is a place that never stopped amazing me. Unfortunately, being towards the end of my PhD, I don't have

Journal of Experimental Biology (2024) 227, jeb247766. doi:10.1242/jeb.247766

A weaned hooded seal pup hauling out on the ice. Photo credit: Chiara Ciccone.

the time or possibility to do any fieldwork now, but I really hope that in the future I will find my way back there.

What is the most important lesson that you have learned from your career so far?

Resilience. I have learned that the most important part of this job is to be able to keep going. That is when you are seasick in the middle of a storm in the North Atlantic Ocean, or you have spent days in the Greenland Sea unable to find a seal anywhere on the ice, or when your western blots are not working even after a thousand repetitions. I have learned that is important not to judge my personal success over a failed experiment. What matters the most is to be able to come back to it, ready to learn from what went wrong before.

Reference

Ciccone, C., Kante, F., Folkow, L. P., Hazlerigg, D. G., West, A. C. and Wood, S. H. (2024). Circadian coupling of mitochondria in a deep-diving mammal. *J. Exp. Biol.* **227**, jeb246990. doi:10.1242/jeb.246990