

ECR SPOTLIGHT

ECR Spotlight – Emilie Mauduit

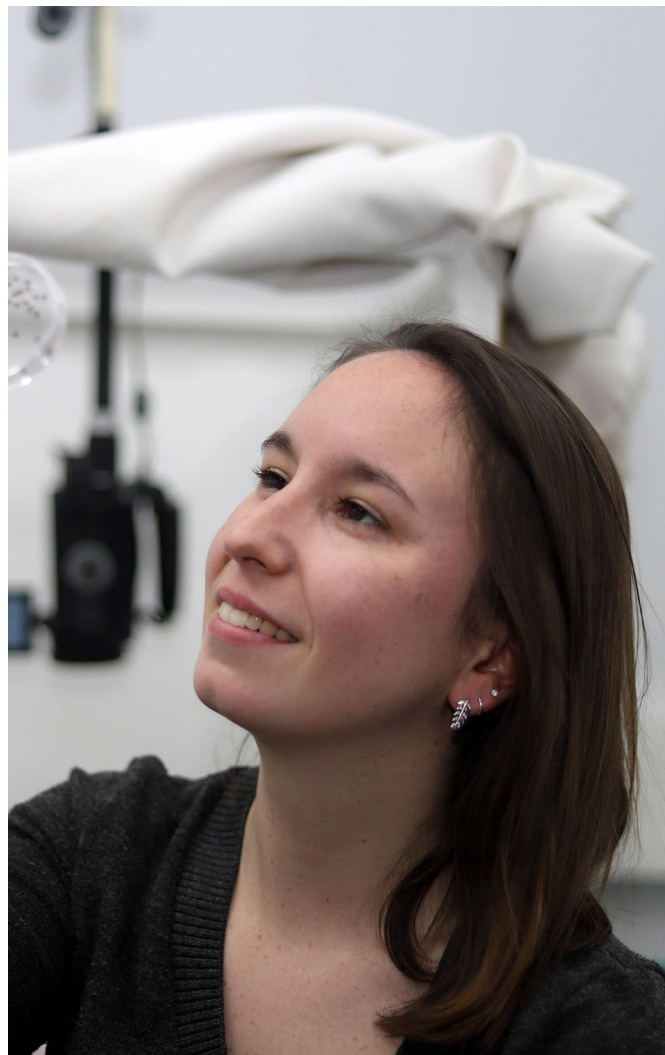
ECR Spotlight is a series of interviews with early-career authors from a selection of papers published in Journal of Experimental Biology and aims to promote not only the diversity of early-career researchers (ECRs) working in experimental biology during our centenary year, but also the huge variety of animals and physiological systems that are essential for the ‘comparative’ approach. Emilie Mauduit is an author on ‘Social recapitulation: moulting can restore social tolerance in aggressive spiderlings’, published in JEB. Emilie is a PhD student in the lab of Raphaël Jeanson at the Research Centre on Animal Cognition (CRCA), Centre for Integrative Biology (CBI), CNRS, Paul Sabatier University Toulouse, France, investigating the origin of sociality in the animal kingdom.

Describe your scientific journey and your current research focus

I graduated with two master’s degrees in ethology and ecology, and obtained a PhD grant from the French Ministry of Higher Education and Research to study social behaviour in spiders. I am interested in investigating the origin of sociality in the animal kingdom, by studying spiders. Indeed, permanent sociality is a behavioural innovation that has emerged during evolution in several species of vertebrates, insects and arachnids. However, the mechanisms underlying this evolution are still unknown. Spiders represent a key model for understanding the emergence of permanent sociality. Indeed, of the more than 50,000 species of spiders in the world, they all express a transient social life: juveniles are gregarious, then become solitary and aggressive as adults (except for 20 species of spiders that remain social throughout their lives). Identifying what maintains spiderlings in groups would help to understand how perennial societies, of spiders and other species, have emerged during evolution.

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

In this paper I have demonstrated that spiderlings that were aggressive towards their conspecifics become socially tolerant again if exposed to conspecifics immediately after the first moult outside the egg sac. Juveniles of *Agelena labyrinthica* spend the whole winter in the egg sac without eating or cannibalising. Then, in the natural environment, after emergence from the egg sac, spiderlings will remain in a group on the web for about 10 days, then disperse, eat and moult. At this stage, they are aggressive and solitary. My results indicate that the moult could somehow ‘mimic’ a second birth, and that there is a critical period during which the spiders can socially re-imprint themselves on their conspecifics. These results are, on the one hand, very surprising because they imply a high degree of behavioural plasticity in spiders, i.e. the ability of an individual to adapt its behaviour to environmental



Emilie Mauduit

conditions. On the other hand, they imply that the gradual increase in the maintenance of social tolerance through cooperation between juveniles could be the origin of the emergence of permanent sociality.

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

Sociality covers an incredible variety of forms: from transitory groupings of usually solitary species such as flies, to species living in integrated societies, called eusocial species, such as ants. Despite this diversity, research on the evolution of permanent sociality has focused over the last 60 years on the appearance of these eusocial species, to the detriment of characterising transitions to less complex forms of social organisation. This study is the first in over 20 years to highlight the critical role of juvenile interactions in the expression of social tolerance, opening new pathways for understanding social transitions.

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A hundred juveniles of *Agelena labyrinthica* just after hatching from the egg sac.

Which part of this research project was the most rewarding/challenging?

The whole experiment is based on the anticipation of the spiders' moult. Indeed, I had to isolate spiders raised in groups when they were about to moult, in order to control the social context after the moult. This was the most challenging task, because a spider that is about to moult only shows a slight swelling of the abdomen, which is very subtle to detect. Moreover, moulting for a juvenile *A. labyrinthica* only lasts about 10 min, which is very fast and easily missed. Therefore, it was complicated and very energy consuming

to follow the spiders on a daily basis and try to spot when they would moult. It required a lot of observation and concentration.

What changes do you think could improve the lives of early-career researchers, and what would make you want to continue in a research career?

The very small number of permanent positions available is the biggest obstacle for young researchers to continue in a research career. After several years of postdocs and precarious contracts, the majority of young researchers who are still willing to fight for a position are not necessarily the most brilliant in their field, but the most tenacious. This low number of permanent positions is thus at the origin of a very high competition between young researchers. In order to improve the lives of early-career researchers, improving access to research funding for the first positions after graduation could help. Then, we should review the selection systems for candidates, and for example stop trying to publish papers systematically in journals with a high impact factor, to the detriment of the journal's publication policy.

What's next for you?

After obtaining my PhD in the autumn of 2023, I hope to join Jayne Yack's team (Carleton University, Ottawa) for my first postdoc to continue working on the origin of permanent sociality using social and solitary caterpillar models. For this I hope to obtain a grant to finance my project.

Reference

Mauduit, E. and Jeanson, R. (2023). Social recapitulation: moulting can restore social tolerance in aggressive spiderlings. *J. Exp. Biol.* **226**, jeb245387. doi:10.1242/jeb.245387