

## ECR SPOTLIGHT

## ECR Spotlight – Martin Dessart

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. Martin Dessart is an author on 'Acute and chronic sublethal chemical pollution affects activity, learning and memory in mosquito larvae', published in JEB. Martin conducted the research described in this article while a PhD candidate in Claudio Lazzari's lab at Insect Biology Research Institute - UMR 7261 Centre National de la Recherche Scientifique/University of Tours, France. Martin is now a Postdoctoral associate in the lab of Clement Vinauger at Virginia Tech - Blacksburg, USA, investigating how animals, particularly insects, integrate information from their environment to adapt their behaviour.

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

My scientific journey began with a 5 year engineering degree, including 3 years apprenticeship in an aeronautics company, where I developed analytical and project management skills. I then spent a year gaining experience with animals, assisting a vet in Zambia, volunteering at the Auckland Zoo, and working in an animal shelter. I loved it, so I joined a Master's program in Ecophysiology, Ethology and Ecology, where I spent two intense years catching up with my knowledge in biology which I had last studied in high school.

During my Master's, I thoroughly enjoyed an internship with Prof. Martin Giurfa on honeybee cognition in the Pyrenees. When one of his former PhD students proposed a project on cognition in mosquito larvae, I immediately jumped in. I developed automated behavioral assays to study learning in mosquito larvae and we demonstrated that different mosquito species were capable of habituation and short-term memory, influenced by environmental conditions and the presence of pollutants. During these experiments, we simulated a predator approaching the larvae, and I now extend this concept to adults. In the Vinauger lab, I now study how multisensory cues interact to modulate visual escape responses in mosquitoes, using behavioral assays and electrophysiological recordings. I am also involved in a project investigating how shifts in light cycles affect the circadian clock of mosquitoes.

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

Freshwater ecosystems, such as ponds, lakes and streams, are vital for biodiversity and humans, but are increasingly threatened by pollution. In these waters, even tiny amounts of pollutants can disrupt life in ways that are hard to detect. In our research, we studied mosquito larvae to see whether their behavior and ability to learn and remember information could inform us about water quality. We tested three common pollutants (two herbicides, used on crops: glyphosate and atrazine; and one medicine drug: paracetamol) on the mosquito species *Aedes aegypti*, which is invasive and known for transmitting



Martin Dessart

major human diseases such as dengue, Zika and yellow fever. We found that these tiny aquatic insects can learn and remember information, but exposure to pollutants alters their cognitive performance and makes them hyperactive. Importantly, very small amounts of these chemicals interacted together to disrupt their cognitive abilities, a result which cannot be assessed by traditional water analyses or biodiversity surveys. Such negative effects could influence how mosquito larvae, and likely other freshwater species, react to important cues such as the presence of food, companions or predators, and survive in their environment. Through automated and controlled experiments, our work provides the first proof of concept that mosquito larval behavior can serve as a sensitive biological indicator of freshwater ecosystem health.

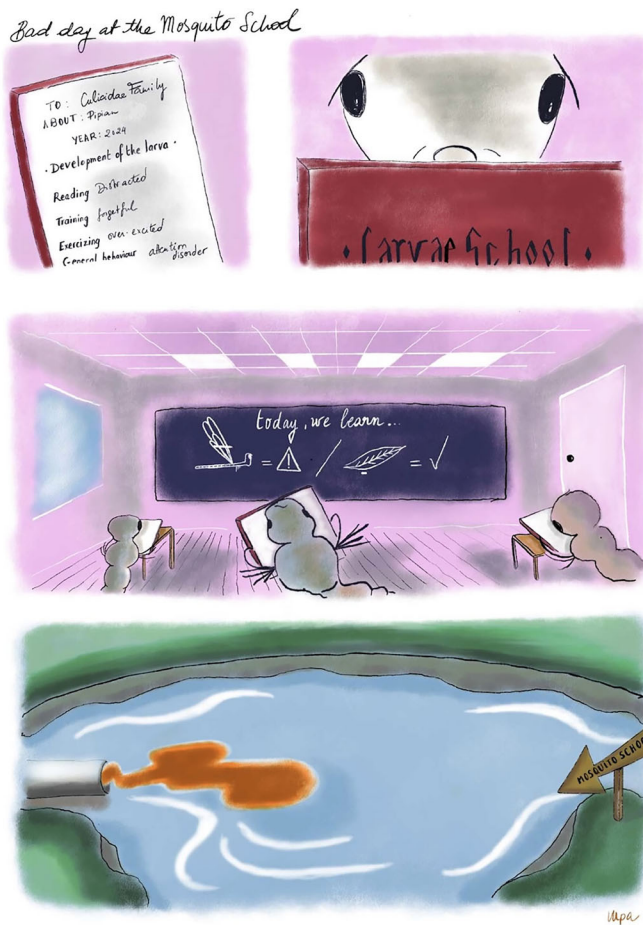
### What do you enjoy most about research, and why?

What I enjoy most is sharing time with people who are passionate. In research, we are (or we should be!) constantly reading about astonishing abilities of animals and discovering incredible things about nature. Therefore, teaching and mentoring students, collaborating and connecting with researchers in my community is incredibly rewarding and keeps me deeply motivated and inspired. Above all, working to better understand how animals function and think is the best way I could dedicate my time and invest my energy.

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

The hardest challenge has been accepting that sometimes I cannot fully control a situation. This could be how others work, supervise or communicate, issues with experiments, or the growing difficulties facing research overall, including the fact that science is under attack. Being naturally impatient, I've learned to take a step back, escape through sport and artists, and also draw inspiration from my brother. It is a constant work in progress and an ongoing reflection.

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Cartoon showing how mosquito larvae's learning and activity are disrupted by chemicals in their environment.

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

I think people often focus too much on the species or system they want to work with, while what really counts in a PhD is learning the process of how to do research, which is inherently multidisciplinary. I believe that the most important factor when starting a PhD is to trust your team and supervisor and be trusted in return. My tip is: find a place where you feel comfortable and take time to connect and feel the connection with your potential supervisor. This can also involve reaching out to people who are working or have worked with your potential supervisor to ask questions and gather information.

### What do you like to do in your free time?

I am an avid reader, moving between fantasy, science fiction and popular science books. I've also just returned to rugby in the past year, both as a player and starting as a coach. It's a fantastic team sport that combines camaraderie, commitment to the team, pushing your limits, plenty of laughs and, importantly, celebration! I also enjoy music but I am very picky and listen mostly to London artists who mix underground electronic such a drum and bass and UK garage rhythms with modern jazz. When the weather is nice, I love walking in the mountains, birdwatching or walking dogs at the shelter near where I live.

### Reference

Dessart, M., Lazzari, C. R. and Guerrieri, F. J. (2026). Acute and chronic sublethal chemical pollution affects activity, learning and memory in mosquito larvae. *J. Exp. Biol.* **229**, jeb250493. doi:10.1242/jeb.250493