

An interview with Dr Charissa de Bekker (Utrecht University)



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During the 19th to 22nd of August, evolutionary researchers from around the world gathered together in Barcelona for the European Society of Evolutionary Biology conference ESEB 2025. The conference resulted in more than 600 talks, 1000 posters in parallel sessions and five plenary talks showing the latest of the Evolutionary Biology field. Among these five plenary talks, Dr Charissa de Bekker broadcasted her latest research on “zombie ants” and the fungal infections that manipulated behaviours of some species of insects.

Dr Charissa de Bekker is currently an associate professor at Utrecht University, whose main research centers around

unraveling the mechanisms that underlie parasite manipulation of host behavior, both from the host and the parasite perspective. Dr de Bekker has been granted an NSF CAREER award and an ERC Consolidator grant to conduct her research.

Q—First, I would like to dive into the beginnings of your scientific career. What inspired your initial interest in nature and science?

I guess I don't have a very inspiring: “I was a born naturalist or scientist story to tell”. In fact, it wasn't until the research experience I gained during my Masters

that I realized I loved science and that becoming a scientist was a career option. I was the first in my family to go to university and I simply chose to study biology because that was my favourite topic in high school. I was incredibly unprepared for an academic career and I certainly did not have any idea what I could do with my degree. I just knew I wanted to get out of the small village I grew up in and that I loved to learn new things. So, I moved to Utrecht and worked my way through the biology curriculum just choosing the courses that seemed interesting to me. And ever since, the more I learned about the natural world, genetics and evolutionary biology the more fascinated I became. However, only when my mentors during my Masters asked me if I had considered doing a PhD next, I realized I could turn this fascination and doing research to gain new knowledge into a career.

Q- Your background and first works were studying development and gene regulation in *Aspergillus niger*, in which moment did you decide to change models and start working with *Ophiocordyceps* and its parasitism?

Because I just followed my interests as they got triggered during my Bachelors and Masters, it somehow had led me towards

molecular microbiology with fungal genetics as the main focus. However, during my PhD, I realized I missed thinking about the bigger picture. Because I was focusing on gene regulation in a model organism in a laboratory context, my research did not necessarily contribute to understanding this organism's ecological role or how it evolved the way it did. So, though the process of my PhD research was fun and interesting, I kinda lost that interest while I was writing my thesis. However, that was the time when I also learned about *Ophiocordyceps*, as explained by Sir David Attenborough in Planet Earth. I was instantly obsessed by the topic. Then, serendipitously, I met the one person who worked on this topic at the time: David Hughes. He was about to start his own lab at Penn State and was looking for a postdoc who knew how to wrangle fungi. And the rest is history.

Q- Did you find particular challenges in changing models and especially, including an animal model, the parasited ants?

Getting to know the fungus well enough to isolate and culture it was by far the biggest challenge, since *Ophiocordyceps unilateralis* was basically considered unculturable. However, some persis-

tence, patience and creativity eventually did the trick. Getting to learn about and include an animal model on the other hand was a blast and did not feel challenging at all! At Penn State, I was surrounded by incredibly knowledgeable entomologists, and my PI was a behavioural ecologist who knew ants and other social insects really well. Additionally, I had the privilege to attend the famous Ant Course, where I learned from world class myrmecologists how to find, sample and identify ants. So, you could say I was in the perfect environment, surrounded by amazing scientists who made this career switch easy and fun.

Q- These fungi and insects are not classic models, so your research entails field work and also lab work? How do you tackle your studies in the lab? Which type of approaches you use to answer host-parasite interactions and evolution?

Though both are indeed not classic models, we have been able to develop methods to culture the fungus, perform infection experiments and do behavioural assays, so we can study this parasitism and its behavioural effects in detail in the lab. Making use of these developments we produced several omics datasets over

the years that produced multiple hypotheses about the genes and molecules that could be involved in these host-parasite interactions. Currently, we are testing these hypotheses by incorporating model organisms, for which genetics tools have been developed, where we can. This way we are at least starting to tease apart some of the more conserved host pathways that are being targeted by these fungi.

Q- In your opinion, what are the most important gaps to be filled to understand host-parasite co-evolution?

It's hard to point at the most important gaps, because I feel there are so many that need to be filled! We know relatively about this topic, which is inherent to its complexity. But to name a few gaps that I would be excited about seeing filled: the study of more diverse parasite-host interactions beyond the well-studied model organisms to understand what general patterns occur across taxa and ecosystems. For one, this way we'll learn how representative our detailed model system studies really are. Another aspect I am fascinated by are continuums, such as generalist-specialist, necrotroph-biotroph and mutualist-parasite continuums, and how organisms move across these scales both

in ecological contexts and over evolutionary time. Understanding the selection pressures and genes involved in the movement along those scales would contribute so much to our general understanding of organismic co-evolution.

Q- During your career you have been in different laboratories in US and Europe, do you find many differences between them?

I think overall, the differences weren't that large, at least for the places I have been, but I might be biased by having been in labs that are pretty international with regards to their lab members. So you get a nice mixture of cultures that eventually make up the lab culture. Of course every institute has its particular things, that work well, and those that could be organized better or easier. And some places have more/better facilities than others. But eventually in all places it comes down to the people who are passionate about and do the actual science. If there's one cultural difference perhaps between the US and Europe, which also exists outside of academia, it's the working hours. I think in Europe, we value a clear separation between work and free time a bit more.

Q- You obtained an ERC consolidator grant very recently, what did obtaining such a grant mean to you and your lab?

Obtaining this grant was of course huge! It has given us the room to explore our ambitious research ideas and, for the first time, really dive into some mechanistic questions about parasite extended phenotypes. The funding landscape in the Netherlands is a bit more conservative, while the ERC consolidator is allowing us to take some important steps to really advance our research. With this funding, I have also been able to put together a young interdisciplinary research team where researchers from diverse backgrounds combine their expertises to answer research questions about parasite extended phenotypes from all sorts of directions. I truly believe in this type of approach when it comes to tackling complex natural phenomena like the one we work on.

Q- Finally, what advice would you offer to the new generation of women evolutionary biologists?

Realizing how I didn't have a clear plan that got me where I am today, - I just followed my gut instinct when mak-

ing big life decisions - I'm not sure if I'm the person to ask for advice. But for what it's worth, I believe in following your interests and daring to be ambitious. Academia can be a pretty wild ride where we make big commitments and spend a lot of our precious time learning skills and problem solving until we get the answers to our questions. So, in my humble opinion, we should try to make the questions that we are asking those we are excited about.