

Role of gene regulation in the social control of queen behavioral specialization in ants



PhD position in Evolutionary Biology

Registration deadline: 20 January 2022

Application deadline: 27 January 2022

The **Libbrecht group** at the Johannes Gutenberg University of Mainz (Germany) is offering a 3-year PhD position (DFG, fully funded with possibility of extension, 65% TVL E13) to **study the role of gene regulation in the social control of queen behavioral specialization in ants**. The PhD student will be supervised by Romain Libbrecht (JGU Mainz) in collaboration with Joe Colgan (JGU Mainz), René Ketting (IMB Mainz) and Franjo Weissing (University of Groningen), and will be integrated in the GenEvo research training program (<https://www.genevo-rtg.de/>).

Division of labor between specialized castes is central to the functioning and evolution of insect societies. Queens monopolize reproduction, while workers perform all the tasks necessary to maintain the colony. Queens are typically seen as egg production units, to the point where their function in insect societies has been compared to that of the germline in multicellular organisms. Some of our recent work has challenged this longstanding view by revealing unexpected flexibility in queens of the black garden ant *Lasius niger*. We have shown that the presence of workers inhibits brood care behavior in founding queens. Moreover, we found that removing workers from established colonies caused old queens to revert to expressing brood care. These results indicate that the presence of workers not only initiates, but also maintains the behavioral specialization of queens that can live up to 30 years. As a means to understand the molecular basis of queen behavioral specialization, we have also performed brain RNAseq to identify genes that differ in expression between queens with and without workers. In this project, we will ask the question: **What are the gene regulatory mechanisms that regulate the gene expression changes underlying the social control of queen brood care behavior?**

The project will include empirical and theoretical components. The empirical investigations will involve the collection and experimental manipulations of ant colonies, extensive behavioral analyses, RNAi knockdown of candidate genes, molecular biology techniques, sequencing technologies (e.g., RNAseq, WGBS, ChIPseq) and associated bioinformatics analyses. The theoretical aspects will be developed in collaboration with Franjo Weissing, including via a research stay in his group at the University of Groningen.

We are looking for a highly motivated student with a Master degree (or equivalent) in biology, good English skills, and a keen interest in evolutionary biology. Previous experience with social insects, molecular biology, statistics and bioinformatics is advantageous, but not required. The successful applicant will join an international, interactive, dynamic and English-speaking scientific environment in a brand new building with access to state-of-the-art, newly equipped laboratories and climate-controlled rooms. The JGU of Mainz hosts many excellent scientific institutions, and Mainz is a historic city located on the Rhine River with a large student population and a rich social and cultural life.

Interested candidates should [register](#) to the IPP before **20 January 2022** and complete their **application before 27 January 2022**. Informal enquiries should be sent to Dr. Romain Libbrecht (romain.libbrecht@uni-mainz.de). The starting date for the position is 1 July 2022. The Johannes Gutenberg University of Mainz is interested in increasing the number of women in science. Applications from women are therefore strongly encouraged. In addition, qualified candidates with disabilities will be preferred.