

## Open PhD position in Evolutionary Genetics & Analytical Chemistry

The Molecular Evolutionary Biology and Chemical Communication group at the Institute for Evolution and Biodiversity at the University of Münster, Germany, are looking to fill a **PhD Position** (TV-L E13, 65%) for the research project:

### Genetic, chemical and behavioral investigation of sexual signaling evolution in parasitoid wasps

The fixed-term position is available for three years and will begin on the **1<sup>st</sup> of September 2019** or as soon as possible.

One of the most important questions in evolutionary biology is how new species potentially originate. The development and maintenance of barriers to interspecific reproduction has been postulated to be the major driving force of speciation. Variations in sexual signaling have the potential to greatly contribute to keep species reproductively isolated through species-specific communication and recognition mechanisms. In the insect model system *Nasonia*, a closely related species complex of parasitoid jewel wasps, we could demonstrate that female cuticular hydrocarbons (CHC) function as species-specific sex pheromones distinguishable by the males, hinting at their profound role in reproductive isolation. Curiously though, in one particular *Nasonia* species (*N. giraulti*), an apparently recent evolutionary leap shifted the female CHC profile out of the males' perceptive range, which, in turn, still retain a potentially ancestral attraction to CHC profiles of females from other species.

In this PhD project, the successful candidate will have the unique opportunity to track this highly unusual evolutionary shift genetically, chemically and behaviorally with the ultimate goal to unravel the key compounds responsible for maintaining the sexual signaling function in *Nasonia* CHC profiles. The PhD candidate will establish experimental female backcrosses based on *Nasonia* hybrids to enable the performance of haploid genetics on *Nasonia* males to assess phenotypic traits related to CHC signaling in the diploid *Nasonia* females. The sexual attractiveness of the resulting hybrid female backcrosses will be simultaneously accessed by our established male mate choice assays as well as gas-chromatographic coupled with tandem mass spectrometric analysis of their corresponding CHC profiles, utilizing our new, state-of-the-art **GC-MS/MS** set-up. Furthermore, the successful candidate is expected to generate a high-density genomic map based on **Restriction-site Associated DNA (RAD)** sequencing for localizing quantitative trait loci (**QTL**) governing CHC variation in the hybrid female backcrosses. To confirm their function, the unraveled candidate gene regions co-localizing with our predicted QTL for CHC variation and female attractiveness will be selectively knocked down in *Nasonia* females utilizing double-stranded RNA interference (**dsRNAi**). Lastly, the successful knockdown in the *Nasonia* females needs to be confirmed behaviorally (male mate choice assays), chemically (GC-MS/MS) and genetically (qPCR), for unambiguously revealing the crucial components and mechanisms governing the sexual signaling function in *Nasonia* CHC profiles.

The successful PhD candidate will be supervised by [Dr. Jan Buellesbach](#) and integrated into the newly established Chemical Communication within the larger framework of Molecular Evolutionary Biology headed by [Prof. Dr. Jürgen Gadau](#). The PhD student will also have the chance to join the [Münster Graduate School of Evolution](#), one of the largest graduate programs in evolutionary biology in Germany.

#### How to apply

The application should be compiled into a single PDF file (max. 5 MB), which should include (1) a cover letter stating the candidate's motivation to join the research project, (2) a CV including information about former academic education and degrees, professional experience, publications (if applicable), fellowships/awards, conference contributions, languages, and further relevant skills and abilities, (3) the candidate's master's thesis abstract, and (4) two letters of recommendation from former supervisors (which can also be sent directly to Dr. Buellesbach by the respective supervisors independently from the applicants' other documents).

Applications should be sent by email as **one PDF file** to Dr. Jan Buellesbach (buellesb@uni-muenster.de). The deadline for the application is **1<sup>st</sup> of July 2019**.

## Requirements

Applicants are required to have a master's or equivalent degree in biology, chemistry or a related field. Applicants are also expected to show a strong interest in evolutionary biology, functional genetics and genomics as well as analytical chemistry. Experience with genomic mapping techniques, particularly **RAD**-sequencing and **QTL** mapping as well as functional genetics approaches such as **dsRNAi** and **qPCR** are highly desirable. Furthermore, high motivation to be trained in state-of-the-art gas-chromatography coupled with tandem mass spectrometry (**GC-MS/MS**) analysis and behavioral mate choice assays will be expected from the potential candidates as well. Other requirements are the capacity to effectively integrate several multivariate datasets, formulate and solve individual research questions, motivation to conduct research independently and finally, fluency in written and spoken English.

The University of Münster is an equal opportunity employer and is committed to increasing the proportion of women in academics. Consequently, we actively encourage applications by women. Female candidates with equivalent qualifications and academic achievements will be preferentially considered within the framework of the legal possibilities. We also welcome applications from candidates with severe disabilities. Disabled candidates with equivalent qualifications will be preferentially considered.

The Institute for Evolution and Biodiversity (IEB) currently integrates nine main research groups working closely together on evolutionary ecology of animals, plants and microorganisms, phylogeny and evolution, biocomplexity, and evolutionary bioinformatics. Our core question is how biodiversity and biocomplexity at all levels of the biological hierarchy arises through evolutionary processes. The city of Münster is very dynamic, with a world-famous heritage center and in the middle of the beautiful park landscape of the "Münsterland". It is a very lively city, once voted as the most livable city in the world, last but not least because of the high number of students, leading to a particularly rich choice of social, cultural and sporting facilities.

## References

- [Buellesbach J., Vetter S.G., Schmitt T. \(2018\) Frontiers in Zoology, 15:22](#)
- [Andrews K.R., Good J.M. et al. \(2016\) Nature Reviews Genetics 17: 81](#)
- [Chung H. & Carroll S.B. \(2015\) Bioessays 37: 822-830](#)
- [Buellesbach J., Greim C. et al. \(2014\) Ethology 120 \(8\):834-843](#)
- [Desjardins C.A., Gadau J et al. \(2013\) G3: Genes, Genomes, Genetics 3: 205-215](#)
- [Buellesbach J., Gadau J. et al. \(2013\) Journal of Evolutionary Biology 26\(11\):2467-2478](#)
- [Niehuis O., Buellesbach J. et al. \(2011\) Heredity 107\(1\):61-70](#)
- [Niehuis O., Gibson J.D. et al. \(2010\) PLoS ONE](#)