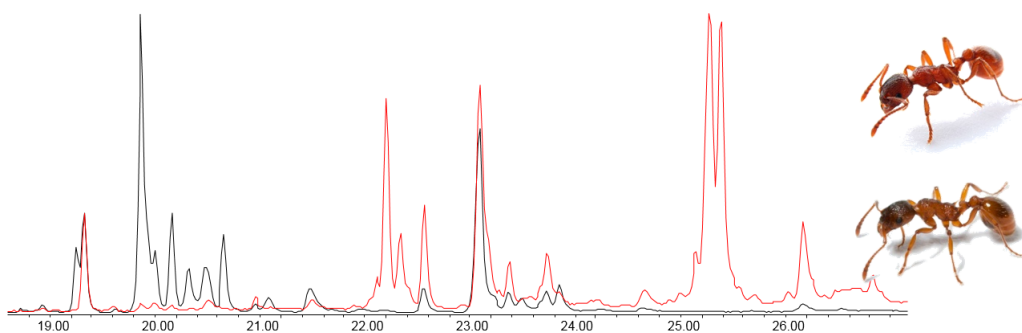


**Master thesis:**  
**Impact of cuticular hydrocarbon changes on their  
physical and communication properties in ants**

Cuticular hydrocarbons (CHCs) cover the cuticle of virtually every insect. They serve two functions at the same time: protecting the insect against desiccation and serving as communication cue. Many insects recognize mating partners or (in social insects) nestmates based on their CHCs. Both functions are mediated by the CHC composition, i.e. the relative quantities of different hydrocarbons in a profile. We already know that insects change CHC composition at different climates to cope with changed waterproofing requirements (Menzel et al. 2017). However, it is still unclear how these changes translate into the biophysical properties relevant for waterproofing, and how they affect communication.

We search for a highly motivated Master student to investigate the consequences of acclimatory CHC changes for the visco-elastic properties and the communication cues encoded in the CHC profile. The candidate will collect the ant species *Myrmica rubra* and *Myrmica ruginodis* in the vicinity of Freiburg/Breisgau. The colonies will be then subjected to different climate treatments here in Mainz, and the consequences for communication will be tested in behavioural experiments. Furthermore, the candidate will analyse the chemical composition of the CHC profiles using gas chromatography-mass spectrometry (GC-MS).

For ca. 6 weeks, he/she will then work in the lab of Dr. Bérengère Abou in Paris (Laboratoire Matière et Systèmes Complexes, CNRS, Université de Paris VII) to investigate the visco-elastic properties of CHC profiles using microrheology, which is a novel technique developed by Dr. Abou. It allows to measure fluid properties of tiny substance quantities (less than 1 nanolitre), which was impossible until recently.



Cuticular hydrocarbon profile of the ants *Myrmica rubra* (above; black lines) and *Myrmica ruginodis* (below; red lines).

Next to participating in an international collaboration, the candidate will acquire a large range of method skills, including behavioural experiments, microrheology, chemical analysis using GC-MS, and biostatistics. If you are interested or have further questions, please do not hesitate to contact **Dr. Florian Menzel** ([menzef@uni-mainz.de](mailto:menzef@uni-mainz.de)).

**References**

Menzel, F., Zumbusch, M., & Feldmeyer, B. (2017). How ants acclimate: Impact of climatic conditions on the cuticular hydrocarbon profile. *Functional Ecology*, DOI: 10.1111/1365-2435.13008