



# CHEMICAL COMMUNICATION IN ECOLOGICAL SYSTEMS

## Application Call 2024 - Project 11

### Impact of immunity on olfactory circuits in flies and ants

#### Supervisors:

Dr. Silke Sachse (main supervisor)

Research Group Olfactory Coding, Max Planck Institute for Chemical Ecology, Jena

Dr. Yuko Ulrich (co supervisor)

Lise Meitner Research Group Social Behaviour, Max Planck Institute for Chemical Ecology, Jena

#### Background:

Chemosensation and immunity play a key role to combat and prevent infections with pathogens. Both systems involve highly sophisticated mechanisms which share significant similarities as the two systems are capable of detecting specific cues from infectious microbes in the environment via dedicated receptors. This detection triggers complex signaling pathways that are integrated at the whole organismal level. So far these two systems have largely been studied independently, and we have little information on how they interact to provide protection.

#### Project description:

In this project, we will study the crosstalk between immunity and chemosensation (i.e. olfaction and gustation) using two different insect species, the genetic model organism, *Drosophila melanogaster*, as well as the clonal raider ant, *Ooceraea biroi*, a social insect. We will investigate how the chemosensory system and immune system are activated upon infection by various classes of pathogens. Is there any cross-talk between the immune system and chemosensory responses at the circuit and behavioral levels? Are insects able to memorize infections and avoid them in the future? To address these questions we will use state-of-the-art techniques such as 2-photon calcium imaging to monitor neuronal response in the fly and ant brains as well as a variety of behavioral assays to determine modifications upon infections in insect behavior. The data obtained will elucidate how the chemosensory and immune system interact to combat infections.

#### Candidate profile:

We are looking for a highly motivated and creative candidate with training in neurobiology or immunology. Research experience on insect behavior or neurophysiology is preferred. A master's degree in Neuroscience, Biology or a related discipline is required for this PhD position. Proficiency in English (writing and oral) is necessary.

#### Reading (optional):

[https://www.cell.com/current-biology/pdf/S0960-9822\(20\)31353-1.pdf](https://www.cell.com/current-biology/pdf/S0960-9822(20)31353-1.pdf)

<https://www.sciencedirect.com/science/article/pii/S2214574522000190>