OR302
Linking development with worker behaviors using RNAseq and gene manipulations
Christina Schulte

Honeybee workers show altruistic behaviors in contrast to queens and drones, which show behaviors that are related to reproduction. The collective behaviors of the worker bees produce group phenotypes that allow them to remain well-adapted in a changing environment. These worker specific behaviors have been largely described but we have little understanding of the molecular control that specifies these behaviors in the brain during development, and of its evolution that gave rise to social behaviors during the last 60 million years. Differentiation of the worker brain is specified by female- and caste-determining signals. The sex-determining signal is implemented by Feminizer protein (Fem) that regulates female splicing of gene transcripts downstream in the sex-determining cascade. On the other hand the worker specific brain is determined by caste development and differential feeding of royal jelly that induces an increase of the Egfr expression level in queens and a reduction in workers. The caste and sexual signals must be integrated which determines the hard-wiring of the worker bee brain during development. I will present data of an approach that seeks to identify genes, which specify the altruistic worker behaviors by hard-wiring the neuronal substrate during brain differentiation. These genes are essential for worker-specific behavior, but not behavior in general. We identified sexual spliced and caste-specific expressed genes via RNAseq approaches and molecularly verified the splicing or expression pattern of these genes to identify good candidate genes. Finally, I will present data of our honeybee expression system, which will enable for the first time the conditional manipulation of gene functions through genetic transformation. The high efficient integration and expression of this system encourage to knockdown our candidate genes to dissect the gene's role in specifying behavior.