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BOOK OF ABSTRACTS

CO054

CELLULAR RESOLUTION MNEMONIC MECHANISMS IN DROSOPHILA

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Animals constantly reassess the reliability of learned information to optimize their behaviour. A mismatch between learned and perceived information, a prediction error, permits an adjustment of existing memories to adapt to unexpected changes in the environment. We found that omission of expected reward in Drosophila drives extinction learning via negatively reinforcing dopaminergic neurons. In contrast, a partial training trial renders reward memory temporarily labile and initiates memory reconsolidation, which requires different negatively reinforcing dopaminergic neurons and delayed action of positively reinforcing dopaminergic neurons. These data establish that recurrent and hierarchical connectivity between mushroom body output neurons and dopaminergic neurons enables memory re-evaluation driven by reward-prediction error. The functional diversity of dopaminergic neurons suggests that individual cells likely have unique input specificity and perhaps other physiological properties. I have used single-cell transcriptomics to assess potential heterogeneity of dopaminergic neurons.

Keywords: Memory, extinction, reconsolidation, dopamine, single-cell transcriptomics, Drosophila

Communication: From Signal Production to Perception

CO055

GOOD VIBES: A WASP SOCIAL PARASITE INTERCEPTS THE VIBRATIONAL COMMUNICATION SYSTEM OF ITS HOST

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In the most extreme cases of social parasitism, such as in the paper wasp host-parasite system, *Polistes dominula – Polistes sulcifer*, the obligate social parasite has lost the worker caste and it thus relies on its host social system and worker force to rear its own reproductives. In such cases the social parasite fitness depends on its ability to successfully integrate into the host colony and replace the dominant breeder, by intercepting the host communication system. As the host communicates through chemical, visual and vibrational sensory channels, the social parasite would benefit from exploiting each of them to achieve a complete host colony control. Indeed, in paper wasps, substrate borne vibrations are produced by body oscillations and have been suggested to play a crucial role in dominance hierarchies signaling and caste-fate determination. Here we investigated whether the social parasite, *Polistes sulcifer*, which is able to chemically integrate into the society of its host and to visually cheat the host, is also able to integrate into the host vibrational communication system. Thanks to a laser vibrometer we recorded the vibrations produced by abdomen oscillations of social parasite and host females, on both parasitized and control colonies. Our results show that both species produce substrate borne vibrations consisting in groups of repeated broad-band pulses. While frequency distribution largely overlaps, the vibrations produced by the social parasite are characterized by longer and more intense events compared to the host ones. Moreover, we found that host females on usurped nests performed shorter and less intense vibrations than those produced on queen-right colonies. Our results support the hypothesis that the social parasite intercepts the vibrational communication system of its host. This, in synergy with ritualized dominant behavior and chemically signaling, likely allows the parasite to successfully replace the host dominant breeder.

Keywords: Paper wasp, Polistes, abdominal wagging, social parasite, laser vibrometer, biotremology

CO056

TRANSCRIPTOMIC AND MORPHOLOGICAL EXPLORATION OF THE SENSORY SYSTEM OF *DROSOPHILA SUZUKII* OVIPOSITOR

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Drosophila suzukii is an invasive pest that lays eggs on undamaged ripening fruits, rather than in fermenting substrates like most other Drosophila species. It has evolved an enlarged and serrated ovipositor that enables gravid females to pierce intact fruit skin. The location and selection of the best oviposition site involves visual, olfactory, and tactile responses. Here we explored the sensory system of the ovipositor of *D. suzukii*, and we compared it to that of closely related species. We first sequenced the ovipositor transcriptome in *D. suzukii* and in three Drosophila species characterised by progressive changes in oviposition behaviour: annotation and comparison of genes encoding chemoreceptors revealed a set of gustatory and ionotropic receptors conserved among the four Drosophila species. We therefore tested the occurrence of chemosensory neurons in *D. suzukii* ovipositor using an anti-horseradish peroxidase antibody to target presence and shape of neuronal structures: results indicate that neurons associated with *D. suzukii* ovipositor spines are mechanosensory neurons. Further analysis of morphology and ultrastructure support the hypothesis that these structures are involved in mechanoreception. In conclusion, our study supports the presence of mechanoreceptors on the tip of the ovipositor of *D. suzukii* which are probably used to test the stiffness of substrates. However, we cannot exclude a role of ovipositor in chemoreception, since transcription of some chemoreceptor genes seems to be a feature common to Drosophila species.

Keywords: *Drosophila suzukii*, oviposition, chemoreception, mechanoreception, transcriptome