

Symposia

[3S09m]Circuit mechanisms and dynamics underlying olfactory behaviors

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***Videos are available throughout the meeting period.**

[3S09m-02]Dynamics of olfactory representations in the *Drosophila* memory center

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Sensory systems are known to fulfill two seemingly conflicting requirements in order to adapt to dynamic environment; maintaining stimulus representations over time to ensure reliable encoding of sensory information while modifying/optimizing the representations depending on experience. To understand the circuit mechanisms that control both the stability and flexibility of sensory representations, we have been studying odor representations in the olfactory memory center, the mushroom body (MB), in the *Drosophila* brain. We conducted comprehensive volumetric Ca imaging and analyzed the responses of all ~2,000 Kenyon cells (KCs), the principal neurons in the MB, to repeated applications of odors. We found that KCs changed their odor responses upon repetitive application of stimuli; some KCs showed depression while some showed facilitation in an odor identity-specific manner, indicating that the odor tuning rather than the general excitability of individual KCs was modified. Similar change was not observed in the upstream primary olfactory center, the antennal lobe, suggesting that odor representations are modified in the MB through odor experience. Notably, the response correlation between different odors was fairly stable across trials when the KC population activity was compared, indicating that the relative odor representations are maintained at a population level despite the changes at a cellular level. We will discuss candidate mechanisms that might underlie the dynamic changes of MB odor representations.