

Neuromodulatory Bases of Experience- and Social- Dependent Behavior in *Drosophila melanogaster*

Dr. Maximiliano Martinez-Cordera

東京都医学総合研究所 Tokyo Metropolitan Institute of Medical Science

11月4日 16:00 金沢大学宝町キャンパス 医学類B棟 b44



In dynamic environments, animals must integrate sensory input, past experiences, and social information to make adaptive decisions. My doctoral research explored how *Drosophila melanogaster* uses both memory and social cues to guide behavior.

In the first project, I investigated how prior experiences influence sucrose discrimination. Previous work showed that flies can discriminate and prefer the higher of two sucrose concentrations. By systematically decreasing the number of wells containing food, I found that sucrose discrimination declined as food availability decreased. However, I found that flies previously exposed to solutions with different sucrose concentrations maintain a stronger preference for the higher concentration even under limited food availability. This experience-dependent discrimination persisted for over two hours and requires prior exposure to different sucrose concentrations. Moreover, it requires dopamine signaling in the mushroom body, suggesting that memory circuits modulate foraging decisions beyond real-time sensory processing.

In the second project, I examined how social context alters avoidance of noxious stimuli. Flies in groups exhibited stronger heat avoidance than isolated individuals, a phenomenon that disappears under stress conditions, depends on visual cues, early-life social experience, and intact serotonergic transmission. Activation mapping revealed serotonin neurons in the central complex that respond both to direct heat and to observing others' heat responses. Manipulating these neurons or their receptor targets disrupted social modulation of avoidance, suggesting a serotonin-dependent mechanism underlying "avoidance contagion," reminiscent of emotional contagion in mammals.

Together, these studies reveal complementary mechanisms, memory-driven and socially driven, that enable flies to flexibly adapt their behavior, providing insight into the evolutionary roots of decision making and social cognition.

お問い合わせ先：

金沢大学 新学術創成研究機構 数理神経科学ユニット
佐藤 純 (makotos@staff.kanazawa-u.ac.jp)