

A DOPAMINERGIC MEMORY CIRCUIT SIGNALS VALENCE VIA A TRIO OF CO-TRANSMITTERS IN *DROSOPHILA MELANOGASTER*

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Dopamine is an important neurotransmitter conserved across many species, including humans, mice, and the vinegar fly *Drosophila melanogaster*. The function of the dopamine system is also conserved across these species; some of these functions include valence, arousal, and learning. In fly, the dopamine system has been extensively studied for its role in memory, but the mechanism by which it communicates valence is not well understood. To study this, we developed an assay for examining the self-stimulation of dopamine neurons. With this assay, we show that a population of dopamine neurons that mediates appetitive learning also mediates positive valence. In addition, this positive valence is communicated not only by dopamine, but also by octopamine (the insect analogue of noradrenaline) and glutamate. We further show that a subset of these neurons communicates positive valence by dopamine and glutamate, but not octopamine. These results indicate that the *Drosophila* dopamine system communicates positive valence through several co-transmitters, and that subsets of this system utilize different neurotransmitter subsets.