

## **The variability and stochasticity in olfactory circuit**

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### **Abstract**

How the neuronal diversity and variability shape the neural circuits of different individuals is the main theme of our research. This may help us to understand the origin(s) of individuality in the scale of neural circuits. The ~200 olfactory local interneurons (LNs) that are highly diverse and variable across individuals, both morphologically and functionally, serves as a great entry point to address these questions. I will first describe our recent work uncovering 849 functionally distinct innervation patterns of a single identified neuron, TC-LN, in different intact *Drosophila* individuals. These innervation patterns were sexually dimorphic and could be affected by female courtship experience. Accordingly, the postsynaptic neurons, and thus the local circuit of TC-LNs, differed in the brains of mated and non-mated females. I will then introduce our attempt to further explore different forms of LN variability and their extents. Through a large-scale screen to acquire drivers that allow us to label identifiable single or the same types of LNs, we ended up with a group of interneurons that exhibit stochastic innervation patterns in the antennal lobe, the analog of olfactory bulb in mammals. Intuitively, stochastic innervations would compromise the fidelity, and maybe reproducibility, of information coding of the neural circuit. Why a neural circuit allows such stochasticity exist will be discussed.