CDB SEMINAR

Speaker: Liqun Luo

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Title: **"Development of Wiring Specificity of the Olfactory System in Drosophila"**

Date: Tuesday, July 6
Time: 12:00 P.M.～13:00 P.M.
Place: 7th floor Conference Room of Building A, CDB

Summary:

The central problem of neural circuit assembly is how wiring specificity is achieved. The *Drosophila* olfactory neural circuit presents a fascinating system to attack this problem. As in mammals, the *Drosophila* olfactory receptor neurons (ORNs) that express a given receptor converge their axons onto a common glomerulus in the antennal lobe, creating an odor map in this first olfactory structure of the central nervous system. Antennal lobe projection neurons (PNs) send their dendrites into glomeruli and axons to higher brain centers including the mushroom body and the lateral horn. Using MARCM-based systematic clonal analysis, we found that PNs are prespecified by lineage and birth order to send dendrites to specific glomeruli and thereby carry specific olfactory information (Jefferis et al., 2001). Further, we demonstrated that according to glomerular class, PNs have stereotyped axon branching patterns and terminal fields in the lateral horn (Marin et al., 2002; see also Wong et al., 2002). Thus during the construction of the fly olfactory system, a given ORN must target its axons to one of ~50 glomeruli, while a given PN must also target its dendrites to one of ~50 glomeruli, and furthermore the PN must coordinate its dendritic target choice with its axon terminal arborization pattern in higher olfactory centers.

Our developmental and genetic analyses have begun to shed light on how wiring specificity in the antennal lobe is achieved. Surprisingly, PN dendrites and ORN axons appear to have substantial self-organizing properties. For instance, we found that PN dendrites have already created a prototypic dendritic map before ORN axon arrival (Jefferis et al., 2004), and that dendrite-dendrite interactions are essential for the formation and refinement of the PN dendritic map (Zhu and Luo, 2004). On the ORN side, genetic mosaic analyses revealed cooperative interactions between axon terminals of the same ORN classes, and hierarchical interdependence among different ORN classes (Komiyama et al., unpublished data). Thus the precise wiring of the olfactory system likely relies on extensive PN-PN and ORN-ORN interactions to create two prototypic maps, which then come into register through ORN-PN interaction.

I will also give an update of our analysis of transcription factors and cell surface receptors that are necessary for wiring of the olfactory circuits.

Host: Chihiro Hama **Neural Network Development,CDB**
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