School of Neuroscience
Faculty Candidate

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310 Kelly Hall
11:00am – 12:00pm

Temperature sensation in *Drosophila*

Animals from insects to humans show strong behavioral preferences for specific temperatures. These responses promote the avoidance of adverse thermal environments and help maintain optimal body temperatures. However, the molecular receptors that drive these responses are not well understood. While the TRP family is widely appreciated to mediate many aspects of thermal sensing, we have recently found that many of the key neural circuits involved in warmth and cool sensation rely on other classes of sensory receptors, which have not previously been implicated in thermosensation. In particular, we found that the putative gustatory receptor GR28B(D) mediates warmth sensation that drive rapid behavioral responses on steep warmth gradients. At the molecular level, GR28B(D) misexpression confers thermosensitivity upon diverse cell types, suggesting that it is a warmth sensor. At the behavioral level, this GR28B(D)-dependent pathway controls distinct warmth responses from those mediated by the TRP-channel-dependent TRPA1 pathway, suggesting fly thermal preference involves multiple systems relevant in different contexts. We have further found that cool sensing involves another class of sensory receptor, the Ionotropic Receptors (IRs), a family of ion channels previously implicated in chemical sensing. We found that *Drosophila* cool-sensing neurons express multiple IRs that act in a combinatorial fashion to mediate cool detection. Importantly, ectopic IR expression can confer cool-sensitivity, suggesting they may form another class of molecular receptors for temperature. Taken together, these findings reveal new and unexpected complexity in the molecular and neural mechanisms for sensing and responding to temperature.

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