Seminar/Talk

Sensing Light across Breadths of Intensity and Time

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Earth's rotation causes the intensity of environmental illumination to change over many orders of magnitude, driving variations in critical parameters such as temperature and visibility. Accordingly, intensity is tracked for functions that include regulation of the circadian clock, arousal state, and hormone levels. What is the neural representation of light intensity, and how does it cover the necessary range? Furthermore, while temporal resolution confers dynamism to visual perception, temporal integration provides a smoothed representation of overall illumination that is suitable for physiological regulation. How does the visual system resolve millisecond events while also integrating across many minutes and hours? The answers to these questions involve a division of labor among cell types, beginning with the photoreceptors. In mammals, these are the rods, cones, and more recently discovered ipRGCs (intrinsically photosensitive retinal ganglion cells). IpRGCs are unusual in sensing light directly as well as communicating long distances using electrical spikes. They are necessary for regulating diverse aspects of physiology and behavioracross broad ranges of light intensity and over extended time scales. I will discuss how these cells are specialized for their role, including unique characteristics of the opsin that they use to capture light, an interaction between phototransduction and spike generation, and functional heterogeneity among individuals of common morphology. Broadly speaking, the aim is to explore how the biophysical properties of a cell type are matched to particular needs of the organism.

Thursday, May 3, 2018 02:00pm - 03:00pm
Mondi Seminar Room 2, Central Building

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