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Dynamics of the Blowfly Photoreceptor-LMC Synapse[1] CHRISTOPHER BOUGHTER, Univ of Maryland-College Park, ROB DE RUYTER, Indiana University — The blowfly visual information pathway is a well-studied system, from the initial absorption of a photon by a photoreceptor to the corresponding reaction by the fly. One particularly interesting component of this pathway is the communication between photoreceptors and large monopolar cells (LMCs). Photoreceptors transmit information to an LMC through the release of vesicles containing histamine. The dynamics of vesicle release is usually modeled as an inhomogeneous Poisson process with a rate driven by the presynaptic voltage. Preliminary experimental evidence suggests that this release may have a more complex temporal structure consistent with a population of driven oscillators. To determine the validity of this model, in-vivo measurements were made on both photoreceptor cells and LMCs. The response of these cells to high frequency light pulses was recorded in an attempt to entrain the putative oscillators. In the LMC we observe transient oscillatory behavior after cessation of stimulation at 125 Hz. This behavior is not observed in the photoreceptors, and there is some published evidence that postsynaptic mechanisms are not responsible for these oscillations. These observations are consistent with our hypothesis, but future work is needed to determine the validity of the idea.

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