

Current issues in invertebrate phototransduction: Second messengers and ion conductances

O'Day, Peter M.

Bacigalupo, Juan

Vergara, Cecilia

Haab, Joan E.

Investigation of phototransduction in invertebrate photoreceptors has revealed many physiological and biochemical features of fundamental biological importance. Nonetheless, no complete picture of phototransduction has yet emerged. In most known cases, invertebrate phototransduction involves polyphosphoinositide and cyclic GMP (cGMP) intracellular biochemical signaling pathways leading to opening of plasma membrane ion channels. Excitation is Ca^{2+} -dependent, as are adaptive feedback processes that regulate sensitivity to light. Transduction takes place in specialized subcellular regions, rich in microvilli and closely apposed to submicrovillar membrane systems. Thus, excitation is a highly localized process. This article focuses on the intracellular biochemical signaling pathways and the ion channels involved in invertebrate phototransduction. The coupling of signaling cascades with channel activation is not understood for any invertebrate species. Although photoreceptors have features