

Photoreceptors in the brain and light regulates biological clock for reproduction in the ascidian

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Since ascidians, a primitive chordate, spawn at a fixed latency period after sunrise, light must regulate a biological clock for reproduction in the ascidians. We successfully visualized and determined localization of retinal proteins in the cerebral ganglion of the ascidian by the time-resolved fluorescence difference imaging method. A retinal protein in the cerebral ganglion is a candidate for the photoreceptor that drives the changes in gonadal activity of the gonadotropin-releasing hormone (GnRH) system.

Photoresponses of the cerebral ganglion of ascidian, *Halocynthia roretzi*, were examined and two light-evoked responses recorded extracellularly, a light-evoked slow potential and light inhibition of high frequency spontaneous discharges. These results suggest that pacemaker signals of GnRH neurons are regulated by photoreceptor activation. Immunohistochemical studies showed photoreceptor cells located close to the GnRH neurons and thus the photosignal might proceed from photoreceptor cell to GnRH neuron intercellularly.