Neural pathway and signal cascade in bioluminescence regulation of scale-worm Harmothoe imbricata.

Bioluminescence is widespread phenomena know for the sea dwellers. Marine polychaete *Harmothoe imbricata* known to produce light by the special organ, elytra, the scales that located on the dorsal side of it’s body. Usually the bioluminescent reaction associated with the autotomy of the scale.

It’s known that this reaction is under the control of the nerve system, but the pathway and signal cascade remains unknown.

In our study we investigated the role of 5 different neuromediators, serotonin. FRMF-amine, acetylcholine, dopamine and catecholamine, in order to visualize the distribution and their role in the bioluminescence control.

The nerve system of the scales is the intraepithelial apical nerve plexus. It represented by all 5 neuromediators that were chosen for the study. The glial cells support the entire network. The main network is organized by the serotonergic multipolar neurons with the axons arriving to the main ganglion of the scale on one side and to the dorsal epithelial cells on the other side. FRMF-amide specific network is in the charge of the sensitive papillae mechanoreceptors. Acetilcolinonergic network pays the efferent role and innervates the signaling cells in the dorsal epithelium. As-well signaling cells are innervated by the single catecholaminergic proprioreceptor cells, which axons go to the main ganglion. Single catecholaminergic proprioreceptor cells can be observed in the sensitive papillae together with FRMF-amide sensitive cells. All the receptor cells can start the defense defensive reflex as a reply for the tactile contact of sensitive papillae or the deformation of scale by predator and starting the efferent cascade towards the central elytron ganglion.