Functional morphology of the rhinophore of *Aplysia punctata*

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For marine snails, chemoreception is probably the most important sensory modality for perception at a distance as audition and optical information is limited. The posterior tentacle of *Aplysia*, the rhinophore, is a chemosensory organ [1] and several behavioral studies showed that the rhinophore can detect pheromones [2], initiate orientation and locomotion toward food [3]. We applied immunohistochemical and histological methods to describe the neuroanatomy of the rhinophore of the sea slug *Aplysia punctata.* For the functional approach we performed optical recordings representing the calcium response of neurons within the tentacle ganglion. As amino acids have been shown to be potent stimuli for aquatic animals [4], we used them to induce sensory responses of olfactory neurons in the rhinophore.

For neuroanatomical analyses, rhinophores of *Aplysia punctata* were stained with the fluorescent dyes propidium iodide, phalloidin, 5-HT antibody, DiA and Mallory´s stain. Nuclear labeling with propidium iodide showed two layers of nuclei in the groove-epithelium. With the Mallory´s stain single epithelial cell types could be compared with those found in other studies [5]. Olfactory glomeruli are embedded in a glial layer situated beneath the epithelium. The tentacle ganglion is located at the basis of the groove. The glomeruli and the tentacle ganglion are densely innervated by serotonergic fibers stained as shown by 5HT-immunoreactivity.

Ca^{2+}- signals of neurons in the tentacle ganglion were measured using Fura-2 AM loading. Different amino acids were applied in concentrations ranging from 2µM to 20mM. The response of the neurons varies depending on the type of amino acid and the concentration. Our investigations on the function and neuroanatomy of the olfactory pathway in the rhinophore of *Aplysia punctata* are aimed to lead to a better understanding of neuronal processing of chemical cues and the chemical ecology of sea slugs.

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