

New light on photoreception in Feather stars: phototaxis and opsin expression in *Antedon bifida* (Crinoidea, Echinodermata)

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Abstract:

Crinoids (also called feather stars) are mysterious filter marine animals belonging to the Echinoderm phylum. Like other members of this group, a lot of crinoid species are very light sensitive despite they don't have developed eyes-like structures. This extraocular photoreception has been partly investigated in sea urchins, brittle stars and starfishes but not in feather stars. This study focused on a common European crinoid species (*Antedon bifida*). This species lives at shallow depth in the north Atlantic coasts. We highlighted a negative phototactic behavior in these crinoids thanks to an experimental aquarium exposed to a gradient of luminosity. Different light wave lengths were tested, and the flight behavior was the most significant with the shorter wavelength corresponding to the blue light. The light perception in bilaterian metazoans is induced by prototypic photoreceptor proteins named opsins. Different studies have demonstrated the presence of a great diversity of opsin genes in some echinoderm groups such as sea urchins and starfishes. In this present study we have highlighted by immunofluorescence both rhabdomeric and ciliary opsin expressions in different tissues of *Antedon bifida*. The rhabdomeric opsin immunodetection (the main opsin type present in eyes of Protostomian) was localized in the sensory subepithelial nervous system, by contrast an important ciliary opsin immunoreactivity (the main opsin type in eyes of vertebrate) was evidenced in the top of tube feet on the pinnules. Crinoids are today the most basal group in the phylogeny of echinoderm. Thereby, the study of the light perception in these amazing feather-like animals allow a better understanding of the photoreception evolution in the Echinoderm phylum.