

# OPsin-MEDIATED PHOTORECEPTION IN THE MOST BASAL ECHINODERM GROUP: THE CRINOIDS (CRINOIDEA, ECHINODERMATA)

Youri NONCLERCQ <sup>1\*</sup>, Marjorie LIENARD <sup>2</sup>, Alexia LOURTIE <sup>1</sup>, Emilie DUTHOO <sup>1</sup>, Lise VANESPEN <sup>1</sup>, Igor EECKHAUT <sup>1</sup>, Patrick FLAMMANG <sup>1</sup>, Jérôme DELROISSE <sup>1,2</sup>

<sup>1</sup>Laboratory of Biology of Marine Organisms and Biomimetics, Research Institute for Biosciences, University of Mons, 7000 Mons, Belgium

<sup>2</sup>Laboratory of Molecular Biology of Sensory Systems, GIGA, University of Liège, 4000 Liège, Belgium.

<sup>3</sup>Laboratory of Cellular and Molecular Immunology, GIGA, University of Liège, 4000 Liège, Belgium

\* **Presenting author**, [youri.nonclercq@umons.ac.be](mailto:youri.nonclercq@umons.ac.be)

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Light perception is a fundamental sense in most metazoan lineages. This capacity is mainly mediated by photoreceptor proteins known as opsins. While photoreception is well understood in many animal groups with specialized visual organs, such as eyes or ocelli, it remains relatively underexplored in organisms which primarily rely on extraocular photoreception, such as echinoderms. Paradoxically, these eyeless marine animals possess one of the greatest diversities of ancestral opsin types among bilaterian lineages. To gain a deeper understanding of opsin evolution in this group of deuterostomes, it is essential to study the most phylogenetically basal echinoderm class, the crinoids. These filter-feeder animals use branched arms to capture small planktonic particles in their feeding grooves, which lead to the mouth. Their photoreception remains largely understudied, although it is known that some shallow-water comatulid species are sensitive to daylight.

We conducted a comprehensive study of the photoreception in the European species *Antedon bifida*, examining both morpho-functional and molecular aspects. An analysis of its chromosome-scale genome revealed the presence of only three opsin genes, all of which belong to the rhabdomeric type (i.e., the type containing most arthropod visual opsins). The low opsin diversity contrasts with that observed in other echinoderm classes. The three crinoid opsins were expressed *in vitro*, and their measured absorbance corresponded to blue and green light (respectively 464, 426 and 525nm). These results are largely consistent with behavioural tests that revealed a negative phototaxis with a large peak sensitivity to blue light (463nm) in this species. Finally, two of these opsins have been localised through immunostaining, one in the basiepithelial nervous system of the feeding grooves and the second at the tip of the tube feet. This opsin expression pattern suggests a complex extraocular photoreception system in these feather stars, like that observed in other echinoderms, such as sea urchins and brittle stars.

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