
Greetings in the Dark: Bioluminescence Communication and Myctophids' Photophores

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Abstract

Lanternfishes (Myctophidae) are worldwide distributed fishes with high abundance and species diversity [1]. Besides their ecological importance as a link between zooplankton and top predators some species are consumed in Japanese gastronomy. As the majority of mesopelagic fishes, myctophids produce intrinsic bioluminescence for intra- and interspecific [2]. *Diaphus* are lanternfishes with diverse light organs with proposed specific ecological purposes such as body photophores (camouflage, intraspecific communication) and head photophores (illumination of prey and surroundings, startle predators). The functional structure of myctophids' photophores is only reported in ancient reports which makes it slightly unclear [2 - 4].

Diaphus watasei was captured in Mimase harbour of Kōchi Prefecture, Japan. The analyses of bioluminescence in head and body photophores involved histological structure, coelenterazine assay, reflection spectra of reflecting layer and diffusion and pigmentation of scales covering the photophores.

The results show that the internal structure is generally similar in different types of luminous organs but specific traits can be observed. Head photophores have silver reflection, high coelenterazine contents and are not covered by specific scales. In contrast, body photophores present lower coelenterazine amount, blue reflection and are covered by specific scales for ventral diffusion of light emission. These properties seem to relate with the proposed bioluminescent purposes for the different luminous tissues. Blue-tuned low intensity light emissions with ventral direction from body photophores allow accurate counterillumination camouflage. On the other hand, bright emissions with wider spectra and angle seem more appropriate for bright flashes for illumination or startle predators of head photophores. References: [1] Catul *et al.*, 2011. *Rev. Fish. Biol. Fisheries*. 21:339-354; [2] Haddock *et al.*, 2010. *Annu. Rev. Mar. Sci.* 2:443-93; [3] O'Day, 1972. *University of Southern California*; [4] Denton *et al.*, 1985. *Proc. R. Soc. Lond. B*. 225:63-97.

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