Photoacclimation of Prymnesiales (Haptophyta) species to different light quality conditions

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Light conditions under water vary considerably in terms of both quality and quantity due to the depth with the wavelength-dependent extinction coefficients, the weather with clouds passing over, the day length and other factors. The photoacclimation response aims to balance the light-harvesting and the photoprotective capacities together. Therefore, it participates in the competitive ability of a species through the growth and the survival and plays a substantial role in the presence or absence of a species in a determined habitat. This process involves different chemical and or biological modifications depending on the timescale. In fact, photoacclimation processes are sorted into two categories depending on their short- or long-term dynamics. For example, at long term occur changes in the structure and the composition of both photosystems I and II and particularly at the pigment level, whereas the xanthophyll cycle is activated at short term with the associated non-photochemical fluorescence quenching. Haptophyte algae are interesting as they present a huge variety of pigments with light-harvesting or photoprotective properties. The light-harvesting pigments consist of chlorophyll a, different chlorophylls c such as Chl *c1* and MV-Chl *c3* as well as fucoxanthin pigments such as 19'-hexanoyloxyfucoxanthin and fucoxanthin. The xanthophyll cycle in haptophytes has a photoprotective role and is based on a one-step enzymatic de-epoxidation/epoxidation reaction between two molecules called diadinoxanthin and diatoxanthin. In the nature, the pigment set of a cell changes to cope with the environmental constraints such as the available light in order to maximize its activities, including photosynthesis. This project aims to determine the adjustment of the pigment pool in Prymnesiales to different light quality conditions and observed changes could be related to the light environment in coastal and open-ocean waters, which usually display spectra richer respectively in green and blue wavelengths. In order to study this subject, a range of Prymnesiales species representing different pigment types were grown under different light spectra through white fluorescent light as well as white, red, blue and green LED lights. Subsequently, HPLC analyses were performed to determine the presence as well as the amount of extracted pigments from the algae harvested at the end of the exponential phase.

Keywords: Haptophyta; Prymnesiales; pigments; light quality