

## The accumulation of UV screen photoprotectors (mycosporine-like amino acids) in red macroalgae is influenced by nitrogen availability

Félix L. Figueroa<sup>1</sup>, Félix Alvarez<sup>1</sup>, Paula Celis-Plá<sup>1</sup>, Zenilda Bouzon<sup>2</sup>, Daniela Fernandes<sup>3</sup>, José Bonomi, Francisca de la Coba<sup>1</sup> and Nathalie Korbee<sup>1</sup>

<sup>1</sup>Ecology and Geology Department. Research group "Photobiology and Biotechnology of aquatic organism" Faculty of Sciences. Málaga University. Campus Universitario de Teatinos s/n. 29071-Málaga (Spain)

<sup>2</sup> Department of Cell Biology, Embriology and Genetic. Federal University of Santa Catarina. 88040-970 Trindade, Florianópolis, SC, Brazil

<sup>3</sup> Botany Department Federal University of Rio do Janeiro. Rio de Janeiro. Brasil

<sup>4</sup> Botany Department . Federal University of Santa Catarina. Florianópolis. Brasil 88040-970 Trindade, Florianópolis, SC, Brazil

Red macroalgae produce UV screen photoprotectors (Mycosporine like amino acids, MAAs) in response to increased UV radiation. They are low-molecular weight water-soluble nitrogen enriched molecules, absorbing UV radiation in the wavelength range 310-365 nm due to their cyclohexenone or cyclohexenimine chromophores. MAAs were quantified by means of high performance liquid chromatography (HPLC). The photoprotection capacity in the macroalgae has been inferred by their accumulation under increased UV radiation (spatial and temporal changes), by the correlation with reduced photoinhibition and decreased photodamage and by the increase of antioxidant activity in the cells. Despite the fact MAAs are nitrogen compounds, only few studies on nitrogen enrichment have been conducted. In this study, the influence of inorganic nitrogen on the accumulation of MAAs both under artificial and solar UVR in several macroalgae is presented.

Both MAAs and biliproteins contents of several species increased in ammonium enriched seawater. Algae with high internal N content presented a higher photoprotection capacity, estimated as *in vivo* chlorophyll fluorescence parameters, than those growing under N depletion conditions. The relative composition of MAAs changed both under high irradiance and blue light, increasing the content of palythine and asterina-330 in relation to porphyra-334 and shinorine. In bifactorial experiments of UVR and nitrate, a positive synergic response of both variables on the production of MAAs was found. MAA content also increased under ammonium enrichment, obtained from fishpond effluents. The highest MAA-productivity was observed in outdoor-grown algae, indicating a positive effect of increased PAR and UVR on MAA accumulation. In conclusion, the accumulation of MAAs is favoured by inorganic nitrogen enrichment in the presence of UVR. MAAs can protect the algae against increased UV radiation through a double function: (1) UV screen capacity in both UVA and UVB radiation and (2) Antioxidant capacity of both oxo- and imino-MAAs. The use of MAAs as photoprotective sunscreens in cosmetic products is discussed.

Figueroa L. Felix:

Congratulations, your submission The accumulation of UV screen photoprotectors (mycosporine-like amino acids) in red macroalgae is influenced by nitrogen availability has been accepted for oral presentation at 16th Congress of the European Society for Photobiology which is being held 2015-08-31 at Aveiro.

Thank you and looking forward to your participation in this event.

Francesco Ghetti

CNR Istituto Nanoscienze

[francesco.ghetti@nano.cnr.it](mailto:francesco.ghetti@nano.cnr.it)

16th Congress of the European Society for Photobiology

15 min