NEW METHODS TO EVALUATE THE RELATIVE EFFICIENCY OF VERTICAL MIGRATION AND PHYSIOLOGICAL MECHANISMS AGAINST PHOTOINHIBITION IN MICROPHYTHOBENTHOS

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The capacity of estuarine microphytobenthos (MPB) to withstand the variable and extreme conditions of the intertidal environment, prone to cause photoinhibition of the photosynthetic apparatus, has been attributed to particularly efficient photoprotection mechanisms. However, little is known regarding its actual photoprotection capacity or the mechanisms responsible for the protecting against photoinhibition.

The general objective of our experiments was to evaluate the relative contribution of the photoprotection provided by migration relatively to the overall photoprotective capacity of MPB biofilms and, more specifically, to determine the relative efficiency of the main physiological processes: xanthophyll cycle, antioxidant defenses and D1 protein repair.

A new experimental protocol was developed, combining (i) chlorophyll fluorescence imaging, for the simultaneous measurement of replicates and experimental treatments; (ii) inhibitors for the vertical migration (latrunculin A-Lat A), the xanthophyll cycle (dithiothreitol-DTT) and the D1 protein repair (lincomycin); (iii) recovery kinetics analysis of photosynthetic activity during light stress-recovery experiments.

Our first results showed a high photoprotective capacity with photoinhibition rates remaining below 25%. The contribution of the vertical migration and the xanthophyll cycle to overall photoprotection varied between sampling periods but reached only ca. 20%. This suggests the participation of other photoprotective mechanisms which are currently under study.