THE ROLE OF PHOTOACCLIMATION IN BENTHIC DIATOM PHOTOBEHAVIOUR

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In tidal estuaries, microphytobenthic communities, mainly composed of diatoms, are major primary producers, with crucial ecological role. This high productivity is achieved despite living in extreme and ever changing environment. However, most of the diatom benthic species are motile, having the capability to move in and out of the sediment photic zone. This opens the possibility that these microalgae, could actively choose their exposition to light according to the status of their physiological photoprotective mechanisms (photacclimation). In this work we tested the hypothesis that the migratory photobehaviour of benthic diatoms is conditioned by long term photoacclimation status. The photoaccumulation patterns of cells of the motile benthic diatom *Navicula* sp. isolated from the microphytobenthic community and grown in two contrasting light regimes (20 and 300 µmol quanta m^2 s^{-1}) were studied. Diatoms were exposed to a horizontal wide light gradient (0-1600 µmol quanta m^2 s^{-1}) in a custom-built photoaccumulation chamber, which allowed the cells to freely move and their light distribution was recorded after 3 hours of incubation. A simple transmission ratio index (T750/T675) was used to calculate biomass, using a spectroradiometer to quantify the transmitted light at 675nm (T675) and at 750nm (T750). The photophysiological status of the cultures was accessed using Pulse Amplitude Modulation (PAM) fluorometry, by measuring light-response curves (LCs) of the relative electron transport rate (rETR) of photosystem II (PSII) and the maximum quantum yield of PSII (F_v/F_m). The results showed a photoaccumulation pattern evidencing a clear avoidance of extreme low or high light levels, with a maximum around 65 µmol m^{-2} s^{-1} for the low light-acclimated cells and 104 µmol m^{-2} s^{-1} for the high light-acclimated cells. We found a strong relationship between the photoaccumulation curves and the photophysiology parameters of these cultures, which suggests that the use of motility to select the optimal light exposure depends on cell's photoacclimation status.