

Vertical Migration and Motility Responses in Three Marine Phytoplankton Species Exposed to Solar Radiation[†]

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ABSTRACT

Diurnal vertical migration in the water column and the impact of solar radiation on motility were investigated in three marine phytoplankton species: *Tetraselmis suecica*, *Dunaliella salina* and *Gymnodinium chlorophorum*. Cells were exposed to solar radiation either in ultraviolet radiation (UVR, 280–400 nm) transparent Plexiglas tubes (45 cm length, 10 cm diameter) or in quartz tubes under three radiation treatments: PAB (280–700 nm), PA (320–700 nm) and P (400–700 nm). The three species displayed different behavior after exposure to solar radiation. *Tetraselmis suecica* was insensitive to UVR and under high solar radiation levels, cells accumulated preferentially near the surface. Exposure experiments did not indicate any significant changes in swimming speed nor in the percentage of motile cells after 5 h of exposure. On the other hand, *D. salina* was sensitive to UV-B displaying a significant decrease in swimming speed and percentage of motile cells after 2–3 h of exposure. Moreover, *D. salina* cells migrated deep in the water column when irradiance was high. The response of *G. chlorophorum* was in between that of the other two species tested, with a slight (but significant) decrease in swimming speed and percentage of motile cells in all radiation treatments after 5 h of exposure. While *G. chlorophorum* cells were more or less homogeneously distributed in the water column, a slight (but significant) avoidance response to high radiation was observed at local noon, with cells migrating deep in the water column. Our data clearly indicate that these sub-lethal effects of solar radiation are species-specific and they might have important implications for the aquatic ecosystem.

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