Impact of long-wavelength chlorophyll forms in PSII antennae of *Chromera velia* and *Pheodactylum tricornutum* on the photochemical quantum efficiency

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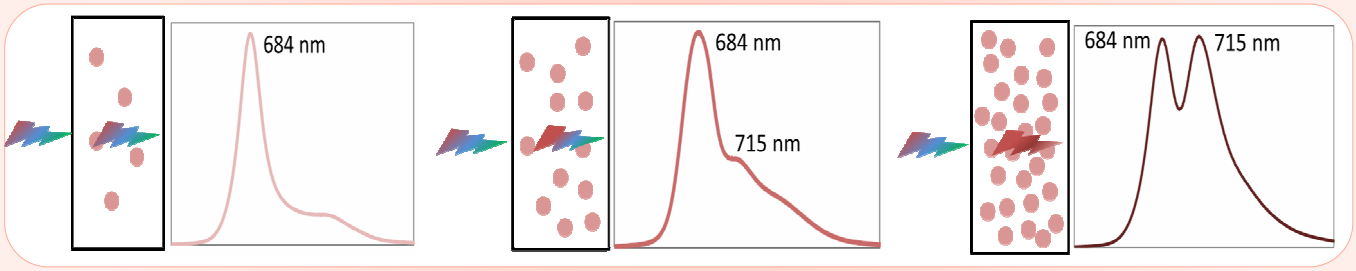
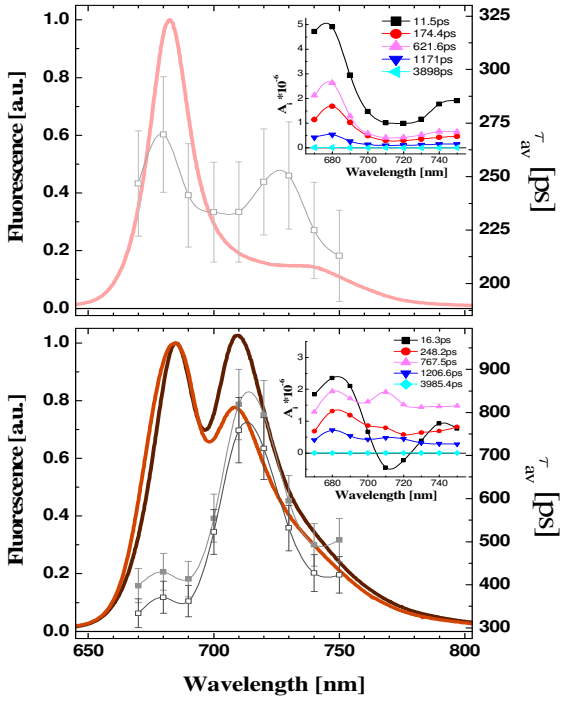
INTRODUCTION AND AIM

Grown under limiting light regimes (~20 μE m^{-2} sec^{-1}) and/or shading conditions, often associated to a high cell density, the red algae *C. velia* and *P. tricornutum* show an intriguing adaptive strategy related to the synthesis of specific antenna isoforms. These harbour moderately red-shifted Chlorophyll forms having maximal emission at ~710-715 nm at room temperature, clearly discernible from the principal emission form of cells grown under unshaded conditions, peaked at ~684 nm (**Caron, L. et al, *Photosynth Res* 1983; Brown, J. S., *BBA* 1967**). In order to investigate whether or not these forms are associated to PSII, as some authors suggested (**Herbstová, M. et al, *BBA* 2015; Belgio, E. et al, *Photosynth Res* 2018**), comparative studies of the steady-state fluorescence emission and dynamics in the ps time domain have been undertaken on cells grown in different light regimes.



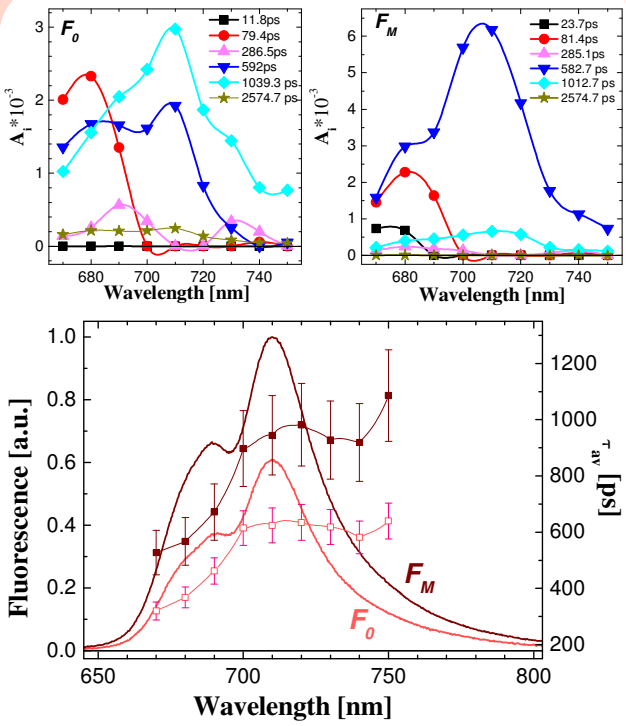
RESULTS AND PERSPECTIVES

C. Velia cells grown under unshaded conditions show one emission peak at ~684 nm and an almost flat τ_{av}. With increasing cell density, they are characterized by a second emission peak at ~715 nm and an increasing τ_{av} increases towards longer wavelengths.



Room temperature emission of *C. velia* cells grown in unshaded (light pink line, upper panel) and shaded (orange and dark red lines, bottom panel) conditions; also shown are the corresponding τ_{av} recorded in unshaded (light grey solid squares, upper panel) and shaded (grey solid squares and dark grey open squares, bottom panel) conditions and the corresponding DAS in the insets.

P. tricornutum cells grown under shaded conditions show both peaks. Under conditions approaching PSII open centres (F_0), the τ_{av} increases towards the long wavelength emission edge. A similar increase is also observed under PSII closed trap conditions (F_M).



Room temperature emission spectra of *P. tricornutum* cells grown in shaded conditions at F_0 (red line, bottom panel) and F_M (dark red line, bottom panel); also shown are the corresponding τ_{av} (bottom panel) and DAS (upper panels).

Our findings, though preliminary, show that both *C. velia* and *P. Tricornutum* red forms are primarily associated to the PSII. Moreover, the dependence of the τ_{av} on the extent of the red forms accumulation is in accordance to previous findings in the PSI, interpreted as a partial kinetic bottleneck for energy diffusion.

Acknowledgments

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