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Evaluating Cyclic Electron Flow around PSI in various microalgae

It is commonly assumed that in plants and green algae, Cyclic Electron Flow (CEF) around photosystem I (PSI) plays a crucial role in optimizing photosynthesis by regulating the photosynthetic control and non-photochemical quenching in photosystem II (PSII), and by providing the extra ATP required for carbon fixation. However, several decades of research did not provide a clear-cut answer about the mechanism, extent, regulation and conservation of CEF among different photosynthetic clades. This is mostly due to the absence of a consensus method to estimate this flow in physiological conditions. The most accepted approach, which compares the quantum yields of PSII (by chlorophyll *a* fluorescence) and PSI (accessible through absorption changes associated to variations of the redox state of P700), can lead to aberrant conclusions regarding CEF. We propose an alternative method based on the electrochromic shift of photosynthetic pigments, to test for the presence of CEF and, where appropriate, describe the relationship between LEF and CEF. We could highlight 3 behaviors: in some photosynthetic species, CEF is not occurring under steady state illumination (e.g. in the dinoflagellate *Amphidinium carterae*). In the ones where CEF exists, it can be independent from LEF (*Symbiodinium sp.*) or dependent on LEF (*Chlamydomonas reinhardtii*). This method can be used to explore how CEF depends on physiological and environmental conditions.