Heterotrophic and/or anoxic metabolism in two microalgae of the Archaeplastida lineage, *Chlamydomonas reinhardtii* and *Galdieria sulphuraria*

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Abstract

Chlamydomonas reinhardtii

Iron-sulfur (Fe-S) proteins in the chloroplast play important role, not only in the light but also in the dark and in anoxia. Chloroplastic Fe-S proteins are assembled by the SUF machinery and then transferred to the client Fe-S proteins using dedicated maturation factors, including NFUs. NFU1 is one of the two predicted chloroplastic NFU proteins present in Chlamydomonas [1]. Two insertional *nfu1* mutants and complemented lines were analyzed. The physiological and molecular analyses revealed that the growth in control light conditions and photosynthesis were not impacted. However, further analyses under specific growth conditions pointed to a role of NFU1 in the maturation of [4Fe-4S] clusters present notably (i) in the dark-operative protochlorophyllide *a* oxidoreductase (DPOR) responsible for chlorophyll synthesis in the dark and (ii) in several Fe-S enzymes involved in the fermentative metabolism.

Galdieria sulphuraria

Heterotrophic growth is an alternative to photoautotrophic growth for algal biomass production. The growth parameters and biomass composition of *G. sulphuraria* were compared when grown on an equivalent molar concentration of carbon from various carbon sources: glucose, glycerol, acetate and xylose [2,3]. The choice of these different carbon sources is justified by their low cost: glycerol is a byproduct of the transesterification process used to produce biofuels from triacylglycerides while glucose, acetate and xylose are the main carbon sources from hemicellulose hydrolysis. The advantages and drawbacks of each of these sources (or a mix of them) will be discussed.

[1] Przybyla-Toscano J et al., (2021) *Int J Mol Sci* **22**, 3175
[2] Perez-Saura et al., (2022) *Front Plant Sci* **13**, 978246.
[3] Perez-Saura et al., (2024) *Algal Res* **83**, 103689