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Title of the M2 research internship:

Architecture and function of Lipid Droplets in response to abiotic stresses in microalgae

Project summary:

Microalgae encompass a great variety of organisms and raise increasing interest for the production of biomolecules of interest. In particular, the ability to accumulate oil-containing Lipid Droplets (LD) in response to abiotic stress, such as nitrogen starvation, is promising for biofuel production. Yet while many studies aim to increase their oil content, the biological function of LDs in microalgae remains poorly understood. The study of the proteome and lipidome of LD in the model microalga *Phaeodactylum tricornutum* upon nitrogen starvation has provided very interesting insight into possible functions of these LDs. In order to go further in our understanding of LD roles, we now want to compare LD biogenesis and content in response to different abiotic stresses, in particular phosphate starvation and high light stress. For this, we will follow the dynamics of LD formation upon those stresses and investigate their proteic and lipidic content at key timepoints.

Keywords:

microalgae, lipid droplets, lipidomics and proteomics

Relevant publications of the team:

Guéguen N, Le Moigne D, Amato A, Salvaing J and Maréchal E. Lipid Droplets in Unicellular Photosynthetic Stramenopiles. *Frontiers in Plant Science*, 2021; 12:639276.

Le Moigne D, Guéguen N and Salvaing J. Lipid Droplets in plants: more than a simple fat storage. *Advanced in Botanical Research*, in press

Jaussaud A, Lupette J, Salvaing J, Jouhet J, Bastient O, Gromova M and Maréchal E (2020) Stepwise biogenesis of subpopulations of lipid droplets in nitrogen starved *Phaeodactylum tricornutum* cells. *Front Plant Sci*. doi 10.3389/fpls.2020.00048

Lupette J, Jaussaud A, Seddiki K, Morabito C, Brugière S, Schaller H, Kuntz M, Putaux JL, Jouneau PH, Rébeillé F, Falconet D, Couté Y, Jouhet J, Tardif M, Salvaing J, Maréchal E. (2019) The architecture of lipid droplets in the diatom *Phaeodactylum*. *Algal Res* 38:101415