

INTERNSHIP PROPOSAL

Institute and Group: BIG/LPCV /Lipidomique membranaire

Supervisor: Salvaing Juliette

Email: Juliette.salvaing@cea.fr

Phone: 04 38 78 56 60

Research project title: Regulation of lipid droplet formation in the model diatom *Phaeodactylum tricornutum*

5 Keywords to describe the project:

Microalgae, lipid droplets, protein interactions, nitrogen starvation

Description of the project (aims, experimental techniques, recommended background):

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 in response to abiotic stress, such as nitrogen starvation, is promising for biofuel production. In order to better understand lipid droplet biogenesis, we have identified an homolog of the Seipin protein, a major player of this process in many species (e.g. yeast, mammals, higher plants), in the model diatom *Phaeodactylum tricornutum* (Pt). We have shown so far that the overexpression of this protein leads to faster accumulation of lipid droplets, only in response to nitrogen starvation and we now want to better characterize its way of action by identifying its protein partners and how these interactions are modulated in response to nitrogen starvation. A first targeted approach will consist in testing/confirming (2-hybrid, GST Pull-down and co-immuno-precipitation (coIP) experiments) the physical interactions between PtSeipin and candidate partners of interest, identified either by sequence homology or after a 2-hybrid screen. In a second part, we will compare the Seipin interactions in normal conditions vs nitrogen starvation. For this, coIPs of Seipin extracted from microalgae in the 2 conditions will be compared by proteomics approaches. For the applicant, interest in plant biology and/or biochemistry is recommended.

Justification that the internship's subject fits with the general theme of GRAL:

The present proposal aims at understanding how interactions of Seipin, a major actor of lipid droplets formation, with other protein partners can change in response to an environmental stress and modulate its action, by integrating data from multiple scales (from protein to cell).

Relevant publications of the team:

Lupette J, Jaussaud A, Seddiki K, Brugière S, Schaller H, Kuntz M, Putaux JL, Jouneau PH, Rébeillé F, Falconet D, Couté Y, Jouhet J, Tardiff M, Salvaing J and Maréchal E

Architecture of lipid droplets in nitrogen-starved *Phaeodactylum* highlights function in stress recovery
Algal Research, accepted

Lupette J, Jaussaud A, Vigor C, Oger C, Galano JM, Réversat G, Vercauteren J, Jouhet J, Durand T and Maréchal E

Non-enzymatic synthesis of bioactive isoprostanoids in the diatom *Phaeodactylum* following oxidative stress.
[Plant Physiology](#), 2018, **178**(3): 1344-1357

Dolch LJ, Lupette J, Tourcier G, Bedhomme M, Collin S, Magneschi L, Conte M, Seddik Ki, Richard C, Corre E, Fourage L, Laeuffer F, Richards R, Reith M, Rébeillé F, Jouhet J, McGinn P and Marechal E

Nitric oxide mediates nitrite-sensing and adaptation and triggers a remodeling of lipids.
[Plant Physiology](#), 2017, **175**: 1407-1423