Master 2 internship project
Year 2020-2021

Laboratory/Institute: Laboratoire de Physiologie Cellulaire et Végétale  
Director: Éric Maréchal
Team: LIPID  
Head of the team: Juliette Jouhet and Éric Maréchal

Name and status of the scientist in charge of the project: Morgane Michaud, CRCN CNRS 
HDR: yes ☑ no X
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Program of the Master’s degree in Biology:

☐ Immunology, Microbiology, Infectious Diseases  
X Physiology, Epigenetics, Differentiation, Cancer  
☐ Integrative Structural Biology  
☐ Neurosciences and Neurobiology  
X Planta International

Title of the project: Development of a tool to study lipid trafficking between the endoplasmic reticulum and mitochondria by yeast genetic engineering.

Objectives (up to 3 lines):
The aim is to develop a new system to follow lipid transport between the endoplasmic reticulum (ER) and mitochondria by yeast genetic engineering. The strategy will be to express plant genes involved in the synthesis of lipids absent in yeast to follow their transport from one cell compartment to another.

Abstract (up to 10 lines):
Mitochondria biogenesis and functions require an extensive exchange of lipids with the ER. Because of the complexity of lipid metabolism and the absence of powerful tools, the mechanisms involved in lipid transport are still puzzling. The goal of the project is to develop a tool to study ER-mitochondria lipid trafficking in yeast. This tool is based on the synthesis of two lipids found in plants (MGDG and DGDG), but absent in yeast. The MGDG synthase MGD2 and the DGDG synthase DGD2 will be expressed in the yeast ER and mitochondria respectively. MGDG produced in the ER will be transported and serves as a substrate to synthesize DGDG in mitochondria. Thus, ER-mitochondria lipid transport will be followed by the quantification of DGDG synthesis in total yeast extracts. The student will be in charge of 1) generating the yeast strain expressing MGD2 and DGD2 targeted to ER and mitochondria respectively, 2) characterizing the strain and 3) validating the tool with known yeast mutants impaired in ER-mitochondria lipid transport.

Methods (up to 3 lines):
Molecular biology (PCR, cloning, yeast transformation); protein analysis (protein extraction, gel analysis and western blot), protein localization by fluorescent microscopy; cell fractionation; lipid analysis; yeast cell physiology (growth curve, investigating mitochondria function); bacteria and yeast cultures.
### Up to 3 relevant publications of the team:


### Requested domains of expertise (up to 5 keywords):

Molecular biology, biochemistry, microscopy, cell culture.