DRF: Thesis SL-DRF-20-0461

RESEARCH FIELD

Plant biology / Life Sciences

TITLE

Vesicular trafficking and chloroplast biogenesis

ABSTRACT

While frequently only identified as the place where photosynthesis occurs, chloroplasts, producing molecular oxygen that we breathe, also catalyze many other essential functions, including assimilation of nitrogen and sulfur, synthesis of carbohydrates (sugars and starch), amino acids, fatty acids and specific lipids, nucleotides, pigments, alkaloids, isoprenoids, hormone precursors and vitamins (Rolland et al., Ann Rev Genet 2012). These organelles thus synthesize most essential organic compounds and are sources of food, feed, biomass and bioenergy production.

Cell compartmentalization is an essential process by which eukaryotic cells separate and control biological processes. The chloroplast envelope is a strategic barrier controlling exchanges of ions, metabolites and proteins between the chloroplast and other cell compartments, thus regulating main functions of the plant cell (Bouchnak et al., Mol. Cell. Proteomics 2019). Most proteins from organelles such as plastids are imported from the cytosol via a specific machinery (Toc-Tic), as precursors harboring a cleavable transit peptide (cTP). In contrast, we (e.g. exemple Miras et al., J Biol Chem 2002; Villarejo et al., Nature Cell Biol 2005; Miras et al., J Biol Chem 2007), and others (Nada and Soll, J Cell Sci 2004; Chang et al., Front Plant Sci 2014), have described non-canonical proteins, lacking a cTP, which use Toc-Tic-independent pathways to reach these organelles. However, if one excludes our recent work (Moyet et al., J Biol Chem 2019), actors and cellular events regulating these non-conventional trafficking events have remained elusive.

We recently demonstrated that these alternative targeting pathways rely on vesicular trafficking (ER/Golgi) and that this trafficking is controlled by environmental constraints (unpublished data). The main goal of the PhD research project aims to identify, and characterize, the molecular actors required for the above-cited alternative routes to the chloroplast and to decipher the role of these alternative pathways in the control of chloroplast biogenesis and functions, and in adaptation of plants to environmental constraints.

LOCATION

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DBSCI
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CONTACT PERSON

Norbert ROLLAND
CNRS-UMR 5168
LPCV/Laboratoire de Physiologie Cellulaire & Végétale
LPCV/iRTSV, CEA/Grenoble
Phone number: +33 4 38 78 49 86
Email: norbert.rolland@cea.fr

UNIVERSITY / GRADUATE SCHOOL

Université Grenoble Alpes
Chimie et Sciences du Vivant (EDCSV)

FIND OUT MORE

http://www.lpcv.fr/en/Pages/ChloroGenesis/Presentation.aspx
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THESIS SUPERVISOR

Norbert ROLLAND
CNRS-UMR 5168
LPCV/Laboratoire de Physiologie Cellulaire & Végétale
LPCV/iRTSV, CEA/Grenoble