

MASTER INTERNSHIP 2022-2023

Laboratory : Reproduction et Développement des plantes (RDP UMR 5667)

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Director of the Laboratory: Gwyneth Ingram

Team: Equipe Signalisation Cellulaire (SiCE)

<http://www.ens-lyon.fr/RDP/SiCE/Home.html>

Person in charge of the Internship: Marie-Cécile Caillaud

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Profile sought: Molecular and cellular biologist

The candidate must demonstrate an interest in cell biology techniques (confocal microscopy, TIRF), molecular biology (cloning, PCR) and biochemistry (Western blot, Coimmunoprecipitation). Scientific English must be mastered.

Possibility of pursuing a thesis: YES

If yes, funding envisaged: Ministry scholarship

Title of internship and thesis: Role of lipids in spatio-temporal coordination of cell division in Arabidopsis.

In plants, structuring by cell division is based on (i) the establishment of the division plane, (ii) on the biogenesis of a membrane compartment called the cell plate, (iii) on the insertion of the cell plate at the level of the division site. It is generally accepted that a landmark is attached to the plasma membrane before mitosis, and that the cell plate is guided to this landmark at the end of cytokinesis. The nature of this positional cue remains elusive, and the processes of cell plate guidance and insertion are poorly understood. Lipids are increasingly recognized as important membrane landmarks, but whether specific lipids mark the site of division has yet to be investigated. Preliminary data indicate that phosphoinositides are involved in defining the spatial site of cell plate insertion. In animals, specific combinations of phosphoinositides and Rab GTPases are responsible for maintaining and coordinating intersecting trafficking pathways in the cell. Our preliminary data suggest that in plants, Rab GTPases may play a role in cell plate insertion. In this project, we will address how lipids and key trafficking proteins such as small GTPases mediate cell plate insertion by deploying a unique combination of genetic, cell biological, and biochemical tools. These include lipid biosensors, inducible lipid depletion systems, super-resolution microscopy, proteomics and lipidomics.

Publications récentes :

Lebecq. A, A. Fangain, E. Gascon, K. Belcram, M. Pastuglia, D. Bouchez, M.-C. Caillaud* (Submitted). *The phosphoinositide signature guides the final step of plant cytokinesis.*

Lebecq A., M. Doumane, A. Fangain, V. Bayle, J. Xuan Leong, F. Rozier, M. Marques-Bueno, L. Armengot, R. Boisseau, M. Simon, M. Franz-Wachtel, B. Macek, S. Ustun, Y. Jaillais*, M.-C. Caillaud* (2022) "The Arabidopsis SAC9 Enzyme is enriched in a cortical population of early endosomes and restricts PI(4,5)P₂ at the Plasma Membrane" [eLife](#)

Press release by [CNRS](#) and at [RDP lab](#)

Caillaud, M. C. (2022). Tools for studying the cytoskeleton during plant cell division. [*Trends in Plant Science*](#)

Doumane, M., **M.-C. Caillaud*** and Y. Jaillais* (2022) "Experimental Manipulation of Phosphoinositide lipids, from cells to organisms" [*Trends in Cell Biology*](#)

Lebecq, A., A. Fangain, A. Boussaroque and M.-C. Caillaud (2022). "Dynamic Apical-Basal Enrichment of the F-Actin during Cytokinesis in Arabidopsis Cells Embedded in their Tissues." **Quantitative Plant Biology**. <https://doi.org/10.1101/2021.07.07.451432>

Doumane, M., M.-C. Caillaud* and Y. Jaillais* (2022) "Experimental Manipulation of Phosphoinositide lipids, from cells to organisms" **Trends in Cell Biology** <https://hal.archives-ouvertes.fr/hal-03588448/document>

Doumane, M., A. Lebecq, L. Colin, A. Fangain, F. D. Stevens, J. Bareille, O. Hamant, Y. Belkhadir, T. Munnik, Y. Jaillais and M.-C. Caillaud (2021). "Inducible depletion of PI(4,5)P₂ by the synthetic iDePP system in Arabidopsis." **Nature Plants** <https://hal.inrae.fr/hal-03298511>