

SEMINAR

Thurs, 23 May 2024 | 2 pm | DBS Conference Room 1

Hosted by Assist. Prof Long Yuchen

Interplay between the plasma membrane and the cytoskeleton during plant cell division



By Marie-Cécile Caillaud

Reproduction and development of Plant lab, ENS de Lyon (France)

About the Speaker

During my PhD (2005-09) (Nice-Sophia-Antipolis, FR) I acquired expertise in plant cell biology. My success in obtaining successive post-doctoral research fellowships (EMBO & Marie-Curie-IEF) led me to develop my independent research program at The Sainsbury Laboratory (Norwich, UK) in 2009-2013. My career aim became to start my research group in a new field, specializing in understanding the regulation of plant cell division by phosphoinositides. After my first parental leave in 2013-14, I established the group at the RDP on the ENS Lyon campus, a major research center in France, where I secured a permanent CNRS researcher position in 2015. After a second parental leave in 2016, I led pioneer work on the interplay between the membrane lipids and the cytoskeleton in plant cells. In 2023, I became Director of research at CNRS (equivalent full professor), still in the same laboratory where I will continue investigating mechanisms regulating plant cell division.

At the heart of cytokinesis, the coordination between the cytoskeleton and the vesicle trafficking is paramount as it separates the mother cell into daughter cells. In this context, many studies have been reported on the role of proteins implicated in the cytoskeleton's remodeling and trafficking. Yet, the mechanism by which the final step of cell division occurs remains unclear. We took an unexplored angle, looking for the role of membrane lipids during cytokinesis, particularly the signaling lipid PI(4,5)P₂. Concomitantly to the apparition of actin cytoskeleton at the pole of dividing cells, PI(4,5)P₂ also polarly localizes at the plasma membrane and is excluded from the cell plate until late cytokinesis. During late cytokinesis, opposing polarity domains are formed along the cell plate: In its “maturing domain”, the cell plate becomes enriched in PI(4,5)P₂ while in its still “expanding leading edge” domain, the PI(4,5)P₂ is actively depleted probably in part by the putative phosphatase SAC9. We propose that PI(4,5)P₂ might act as a polar cue to guide the cytoskeleton at the final step of plant cytokinesis.