



ABSTRACT

“Dividing in the right place - An interactome approach to identify and link the molecular players controlling division zone establishment during plant somatic cytokinesis”

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In plant cells, cytokinesis, the grand finale of the cell cycle, is thoroughly prepared during prophase, when the cortical division zone (CDZ), i.e. the plane where the cell will divide, is established. The first cellular signs of this specification are the appearance of the preprophase band (PPB) of microtubules and the actin depleted zone (ADZ). In contrast to the ADZ, which persists throughout cytokinesis, the PPB breaks down before spindle formation, leaving a landmark at the cortex that acts as a presumed spatial control mechanism for cell division by guiding the expanding cell plate to this predetermined position at the plasma membrane.

Division zone establishment necessarily involves proteins affecting cytoskeletal dynamics and membrane trafficking events, in concert with proteins synchronizing this process with cell cycle progression.

Although spatial determination of cytokinesis is crucial to create the body plan of the plant, division zone establishment during plant somatic cytokinesis is very poorly understood as only few molecular players have yet been identified.

Over the past years, roughly 10 proteins have been associated with division zone establishment. This set of proteins contains both positive and negative markers of the CDZ and includes various classes of proteins including kinesin motor proteins and microtubule binding proteins, Phosphatase subunit proteins, kinases, a GTPase activating protein, and a protein involved in membrane trafficking.

This project aims to achieve a comprehensive understanding of division zone establishment by reverse and forward genetics approaches. First, an interactome map identifying and linking the proteins involved in division zone specification will be built by performing TAP-TAG protein complex isolation experiments using the known molecular players and their interactors as bait. Secondly, an EMS mutagenesis screen on *Arabidopsis* seedlings and a chemical genetics screen on BY-2 cells will be performed to identify plants with altered division planes and to identify compounds that interfere with division zone establishment. Mapping the mutants and identifying the target proteins of the compounds will allow us to position them in the division zone interactome.