Postdoc position in plant development

One unique attribute of plant cells is the presence of a cell wall. Primary cell wall is mostly composed of polysaccharides and proteins that are assembled into interacting networks constantly reshaped during plant growth in order to fit with developmental processes (Zhang et al., 2021). The three major classes of cell wall polysaccharides are celluloses, hemicelluloses, and pectins. Whereas cellulose–hemicellulose network was shown to be essential for cell wall strengthening, loosening and expansion (Cosgrove, 2016), the role of pectin in determining cell wall structure and dynamics has likely been underestimated as suggested by studies carried out on homogalacturonans (Du et al., 2022) and on rhamnogalacturonan II (Peng et al, 2021). Here, we focus on pectic polymers and we aim at addressing the role of the biosynthesis and remodelling of pectin in mechanical properties of cell wall and in cell growth. Indeed, the ability of the cell wall to deform under forces mainly arises from its composition and the interlinking structure of its components (Cosgrove, 2022).

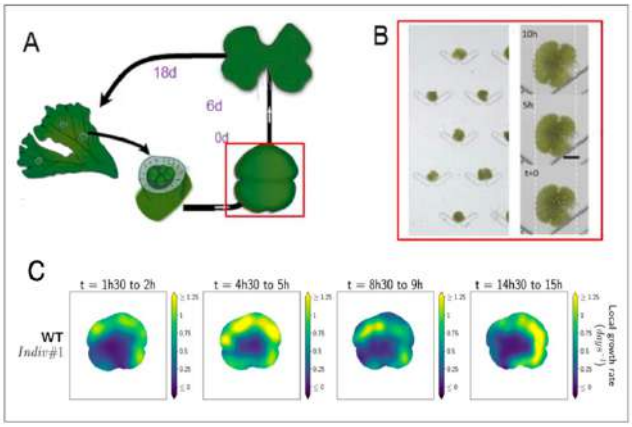

Figure: Marchantia gemma growth. A) Asexual reproduction of Marchantia occurs via formation of clonal gemma (red box), which are produced spontaneously in cup-like structures on the dorsal side of thalli. A gemma germinated, and will develop into a plant with new gemmae cups in approximately 3 weeks. (Adapted from Sauret-Güeto *et al.,* 2020). B) Gemmae can be cultured for microscopic observation in microfluidic devices, allowing rapid screening of lines and live monitoring of growth rate. C) Spatiotemporal variation of growth rate of a gemma cultivated in a microfluidic chip.

We use the liverwort *Marchantia polymorpha* as a model system, which is convenient for genomic and genetic approaches to investigate physiological, developmental, and evolutionary aspects of plant biology (Bowman et al. 2022). In particular, because of its low genetic redundancy, Marchantia circumvents the difficulties associated with the existence of multigenic families.

The postdoc project aims at understanding how does the biosynthesis or remodelling of pectin contribute to cell growth? After selection of candidate genes, the recruited person will build a collection of CRISPR/Cas9 knock-out mutant and overexpression lines (Sauret-Gueto et al., 2020) in which pectin synthesis or remodelling is impaired. The growth rates and elastic properties of individual Marchantia gemmae will be quantified in microfluidic devices, starting from an already established methodology (Laplaud et al., 2024).

Candidates are expected to have a background in molecular, cell and/or developmental biology, and to be interested in working in an interdisciplinary team. The postdoc will have access to all necessary materials and equipment. The start date is flexible and the initial contract will be of two years. To apply, contact Arezki Boudaoud (arezki.boudaoud@polytechnique.edu) and Stéphanie Drevensek (stephanie.drevensek@polytechnique.edu), providing curriculum vitæ, brief statement of research interests, and references. Applications will be considered from February 1st until a suitable candidate is selected.

References:

Zhang B et al. 2021 The plant cell wall: Biosynthesis, construction, and functions. J. Integr. Plant Biol. **63** 251.
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Cosgrove DJ 2022 Building an extensible cell wall. Plant Physiol. **189** 1246.
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Laplaud V et al. 2024 Assessing the hydromechanical control of plant growth. J. R. Soc. Interface **21** 20240008.