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**“Cell wall based control of organ curvature”
PhD research proposition
CSC - ENS de Lyon**

Doctoral School: BMIC ED 340 Molecular, Integrative and Cellular Biology

Title : Cell wall based control of organ curvature

Research team: Biophysics and Development team, Director : Pr Arezki Boudaoud
<http://www.ens-lyon.fr/RDP/spip.php?rubrique19&lang=en>

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Lab Language: English

Abstract:

How do genes sculpt the spectacular array of shapes observed in nature? The PhD project will contribute to address this question using the sepal of Arabidopsis as a model. At the cellular level, plant growth is driven by internal turgor pressure and modulated by the ability of the cell wall to expand under this pressure. Cell wall extensibility depends on cell wall composition, dynamic assembly and remodelling. The objective of the project will be to study growth patterns and mechanical patterns associated with control of sepal curvature. To unravel how curvature changes during sepal development, the student will use live-imaging, image segmentation and quantitative growth analyses for each cell. This will provide 4D (3D in space + time) maps of growth rates allowing us to identify critical stages for establishment of sepal curvature in wild type plants. The same type of analysis will be performed on suitable mutants identified in the team. In parallel, the mechanical properties of cell walls in different zones of the sepal will be quantified using both Atomic Force Microscopy (Milani, 2011) as performed in (Hong, 2016) and hypertonic osmotic treatments (Dubrulle et al., unpublished; Kierskowski Science 2012). This will allow us to connect growth rates with mechanical properties of the cells, in wild type and mutants, and therefore to identify and characterise the function of genes regulating curvature. Modelling of sepal curvature in collaboration with team members, will help us to integrate the different levels of regulation and to understand the causal links between cell wall properties and organ morphogenesis.

References:

- Hong et al. (2016) Dev. Cell 38(1):15-32
- Milani et al. (2011) The Plant Journal 67(6):1116-1123
- Kierskowski et al. (2012) Science 335(6072):1096-9