Epigenetic mechanisms and chromatin dynamics in response to abiotic stresses

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Scientific objectives

As sessile organisms, plants have developed sophisticated mechanisms to adapt their development in response to environmental changes and various stresses. Correct deployment of these developmental and stress response pathways rely on spatially coordinated and dynamic gene expression programs that are controlled by epigenetic mechanisms. In addition, epigenetic pathways are essential to dampen transposable elements (TEs) accumulation and proliferation during normal and stress conditions. Epigenetic changes mostly occur through chemical modifications of DNA and histone proteins, thus influencing gene expression in a mitotically and/or meiotically stable manner. In this regard, epigenetic changes represent an important source of diversity and adaptive potential that may contribute to the improvement of plants. However, the underlying molecular mechanisms remain to be completely characterized.

Recent data from our groups have revealed the diversity of epigenetic mechanisms involved in the regulation of gene expression in plants. Our major breakthroughs and current research projects are:

1) The identification of plant-specific RNA polymerases required for RNA-dependent DNA methylation and the identification of new putative RNA silencing-related factors whose biological function remains unclear and is currently under investigation.
2) The characterization of epigenetic factors required for the repression of TEs, and in response of abiotic stresses, such as heat shock.
3) The study of factors involved in the subnuclear organization of chromatin and regulating gene expression based on the spatial distribution of specific loci within the nucleus and in response of abiotic stresses,

TULIP MTR

Our current and future projects fit with the objectives of the MTR1, **"*Organism - abiotic environment interactions (the scale of the sole organism*)".** Indeed, one of our goal is to understand what are the epigenetic determinants of heat shock response. We are also investigating the effect of abiotic stresses on the subnuclear organization of chromatin.

ETPs involved in the project

Team Lagrange (5 ETP; 1 Non-perm). Team Pontvianne/Moissiard (3 ETP; 2 Non-perm).