Grenoble Alliance for Integrated Structural & Cell Biology

GRAL MASTER 2 RESEARCH SCHOLARSHIP - Program 2017 - 2018

INTERNSHIP PROPOSAL

Institute and Group: BIG, group LPCV

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Research project title: Physical interaction between epigenetic regulators involved in antagonistic histone modifications

5 Keywords to describe the project: Chromatin Biology, Polycomb, Histone methyl transferase, stem cell fate

Description of the project (aims, experimental techniques, recommended background):

The aim of the project is to identify interaction domains between two components of Trithorax and Polycomb complexes, which act antagonistically on chromatin regulation.
Chromatin dynamics plays a major role in regulating genome usage for developmental outputs. We previously showed that the SAND domain-containing protein ULTRAPETALA1 (ULT1) is involved in stem cell fate in plants1 and acts as a Trithorax factor. It activates the expression of a large panel of developmental genes in a manner antagonistic to the chromatin repressive Polycomb factor CURLY LEAF (CLF) 2-4. CLF is the enzyme homologous to the human Ezh2 that methylates Histone 3 on lysine 27 (H3K27me3 repressive mark) 5. The internship project will contribute to our quest for the molecular mechanism through which ULT1 counteracts CLF function. To this aim, the student will work on recombinant proteins in order to (i) characterize ULT1-CLF physical interaction domains (ii) assay ULT1 effect on CLF activity, and will (iii) analyse CLF function in plant cells with modified ULT1 expression.

A background in molecular biology and biochemistry is recommended. Interest in protein purification and interaction assays will be appreciated. Knowledge in plant biology isn't a pre-requisite.

Relevant publications of the team:

1. J. Engelhorn, R. Blanvillain and C.C. Carles* (2014). Molecular control of cell fate in plants: Mechanisms of gene activation from a chromatin point of view. ***Cell. Mol. Life Sc.*** 71(16):3119-37.
2. C. Smaczniak, R.G.H. Immink, J.M. Muino, R. Blanvillain, M. Busscher, J. Busscher-Lange, Q.D.P. Dinh, S. Liu, A.H. Westphal, S. Boeren, F. Parcy, L. Xu, C.C. Carles, G.C. Angenent, K. Kaufmann* (2012). Characterization of MADS-domain transcription factor complexes in *Arabidopsis* flower development. ***Proc Natl Acad Sci USA***. 109(5):1560-5.
3. C.C. Carles and J.C. Fletcher (2009). The SAND domain protein ULTRAPETALA1 acts as a trithorax group factor to regulate cell fate in plants. ***Genes & Development.*** 23: 2723-2728.