UNIVERSITÉ Clermont Auvergne

MASTER BIOLOGIE SANTE

Track « Integrative Biology, Physiopathologies »

Proposal for a Master 2 internship – 2023-2024

Title :
Elucidating a mechanism protecting genes from Polycomb-mediated silencing

Laboratory : iGReD – CNRS UMR 6293 – Inserm U1103 - UCA
Laboratory director : Krzysztof Jagla
Address : 28 place Henri Dunant, CRBC, Clermont-Ferrand

Internship tutor : Olivier Mathieu
Tel : (+33) 4 73 40 74 07
e-mail : olivier.mathieu@uca.fr

Summary :
Multicellular organisms contain different cell types with unique identities despite all the cells sharing the same genome. Cell identity is defined by specific patterns of gene expression that must be established and stably inherited across cell divisions. To allow for the same genome to give rise to different cell types, gene expression that is not needed or even detrimental in a given cell type or in a given developmental stage is shut off. In both plant and animal kingdoms, the major mechanism for transcriptional repression of unwanted gene expression programs relies on proteins of the Polycomb group (PcG). Mutations in PcG proteins cause severe developmental abnormalities and erratic PcG-mediated gene repression is a signature of many cancer types. PcG-mediated gene silencing is an epigenetic process that is driven by structural chromatin changes associated with trimethylation of the lysine 27 of histone H3 (H3K27me3). How specific genes are targeted for PcG-mediated gene silencing is not well understood. Several DNA sequence motifs called polycomb response elements (PREs) have been involved in the recruitment of PcG proteins to specific genes. However, many genes do contain PREs in their promoter sequences and yet are ubiquitously transcribed. This suggests that unknown mechanisms may actively protect certain genes from PcG-mediated silencing. We have discovered proteins that are most likely involved in such protection mechanism at hundreds of genes in Arabidopsis.
The aim of the project is to follow-up on our current approaches to define the mode of action of these proteins in antagonizing PcG-mediated gene silencing.

Methodologies (key words) : *chromatin immunoprecipitation (ChIP), RT-qPCR, cloning, transgenesis*

Publications of the research group on the proposed topic (3 max.)
de Luxán-Hernández C *et al*. (2019) PP7L is essential for MAIL1-mediated transposable element silencing and primary root growth. *Plant J.* 102(4):703-717. doi: 10.1111/tpj.14655.
Ikeda Y., Pélissier T. *et al* (2017) Arabidopsis proteins with a transposon-related domain act in gene silencing. *Nat Commun*. 8:15122. DOI:10.1038/ncomms15122