UNIVERSITÉ Clermont Auvergne

MASTER BIOLOGIE SANTE

Track « Integrative Biology, Physiopathology »

Proposal for a Master 2 internship – 2024-2025

Title **: Study of the dynamics of the actin cytoskeleton during epithelial morphogenesis in Drosophila**

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Summary :

How cells change their relative position to give a particular shape to a tissue is a major question in developmental biology with important implications for regenerative medicine. Our team studies the mechanisms allowing the morphogenesis of epithelial tissues using the Drosophila model and more particularly the elongation of ovarian follicles because of the power of the genetic tools available and the cellular imaging possibilities it offers.

Our team has recently identified a new actin subpopulation within epithelial cells which is necessary for cell intercalation and tissue elongation. Intercalations correspond to exchanges of neighbors in the plane of the tissue and are one of the basic mechanisms explaining how cells rearrange themselves during morphogenesis. Our current data show that this dynamic population is generated by a polymerization complex called Wave Regulatory Complex (WRC), that it is specifically localized at the junction points between several cells. The project will be to explain how WRC activity is controlled in time and space and how tissue elongation emerges from this control. For this, a combination of a living cell imaging approach, genetics and protein interaction will be carried out. This project aims to functionally link events occurring at the molecular (actin polymerization), cellular (intercalation) and tissue (elongation) scales and to bring a multi-scale and integrative mechanism to an important biological question.

Methodologies (key words) : Cell live quantitative imaging, ex vivo culture, Drosophila genetics, CRISPR genome editing

Publications of the research group on the proposed topic (3 max.)

Calvary et al, Tricellular junction recruitment of Wave regulatory complex by Sidekick and Lar induces protrusive activity resolving cell intercalation, **BioRxiv, 2024**

Alegot et al.; Jak-Stat pathway induces Drosophila follicle elongation by a gradient of apical contractility. **Elife 2018** Feb 8;7. pii: e3294

Cerqueira-Campos et al.; Oriented basement membrane fibrils provide a memory for F-actin planar polarization via the Dystrophin-Dystroglycan complex during tissue elongation. **Development**. **2020** Apr 8;147(7)