

Internship Proposal

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Project Title:

Dissecting RhoGTPase regulation to understand how epithelial tissues grow and migrate

Level:

Master Student

Project Summary:

Epithelial tissues are an essential barrier that isolate the internal organ environment from the exterior. This property relies on their ability to establish molecular and functional asymmetries along an apico-basal axis. Epithelial apico-basal organization is a conserved trait whose disruption is a serious threat to development and human health. However, apical-basal organization must also be highly dynamic to drive cell shape changes during cell division or cell migration. Using endogenously GFP-tagged *Drosophila* lines, we identified two uncharacterized RhoGTPase regulators that control 1) epithelial reorganization during cell division (co-supervised by André Carvalho) or 2) cell shape change during tissue migration (co-supervised by Vítor Yang). In these projects, we will combine optogenetic tools, live imaging in *Drosophila* tissues and mammalian cell culture, to discover how these regulators modulate the cytoskeleton and the polarity machinery to shape animal organs.

Work to be developed by the student:

Drosophila genetics; live imaging of cell division or cell migration in *Drosophila* ovaries cultured ex-vivo; optogenetics; immunofluorescence; confocal microscopy of fixed tissues; mammalian cell culture; molecular biology

References:

- di Pietro, F.; Osswald et al., Systematic characterization of *Drosophila* RhoGEF/GAP localizations uncovers regulators of mechanosensing and junction formation during epithelial cell division. *Curr Biol* (in press)
- Osswald, M. et al., (2022). aPKC regulates apical constriction to prevent tissue rupture in the *Drosophila* follicular epithelium. *Curr Biol* 32, 4411-4427 e4418.
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- Zeng, J., Santos, A.F et al., (2021). Target-induced clustering activates Trim-Away of pathogens and proteins. Nat Struct Mol Biol 28, 278-289. 10.1038/s41594-021-00560-2.
- Moreira, S. et al.,(2019). PP1-Mediated Dephosphorylation of Lgl Controls Apical-basal Polarity. Cell Rep 26, 293-301 e297. 10.1016/j.celrep.2018.12.060.

