

CRBM external seminar
Wednesday Oct 26th 11:00 am Salle Marcel Dorée

Composite morphogenesis: how can a tissue fold and extend at the same time

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*Matteo is a cell and developmental biologist, group leader at the Institut de Biologie Valrose in Nice. After a PhD in cell and developmental biology with Pierre François Lenne and Thomas Lecuit at IBDM in Marseille, he joined the lab of Maria Leptin at EMBL, Heidelberg before setting up his own lab in Nice. His team uses the *Drosophila* and sea urchin embryos to bridge gene expression with the force fields that drive the dynamic of embryonic tissue shape. His final aim is to uncover the fundamental cellular and supra-cellular principles driving epithelial morphogenesis*

Abstract

During embryo development, epithelia can undergo different shape transformations. While these changes can be sequential, and thus driven by specific sequential cellular mechanisms, this is not always the case. A single tissue can undergo multiple simultaneous shape transformations resulting in a composite process. For instance, in vertebrates, during neurulation, the dorsal tissue folds forming the neural tube while elongating along the anterior-posterior axis separating the future head from the anus (Keller, 2002). This raises an important question: how can a tissue undergo multiple simultaneous shape transformations if each transformation is per se driven by different and functionally specific cellular mechanisms? In addition, which signaling pathways are controlling composite morphogenetic processes? We use the protostome *Drosophila* and the deuterostome sea urchin *P. lividus* embryo as model systems and focus on the process of simultaneous tissue folding and extension resulting in the formation of an epithelial tube at the onset of gastrulation. By using advanced multi-view light sheet microscopy coupled to infrared femtosecond laser manipulation, optogenetics and quantitative big data analysis, we aim to shed new light on evolutionary conserved signaling pathways, mechanisms and mechanics controlling and driving composite morphogenesis.

Selected publications

John, A, **Rauzi**, M. A two-tier junctional mechanism drives simultaneous tissue folding and extension. Dev Cell. 2021;56 (10):1469-1483.e5. doi: [10.1016/j.devcel.2021.04.003](https://doi.org/10.1016/j.devcel.2021.04.003). PubMed [PMID:33891900](https://pubmed.ncbi.nlm.nih.gov/33891900/).

Rauzi, M, Krzic, U, Saunders, TE, Krajnc, M, Zihlerl, P, Hufnagel, L *et al.*. Embryo-scale tissue mechanics during *Drosophila* gastrulation movements. Nat Commun. 2015;6 :8677. doi: [10.1038/ncomms9677](https://doi.org/10.1038/ncomms9677). PubMed [PMID:26497898](https://pubmed.ncbi.nlm.nih.gov/26497898/) PubMed Central [PMC4846315](https://pubmed.ncbi.nlm.nih.gov/PMC4846315/).