

Dynamics and Mechanics of Drosophila Head Eversion

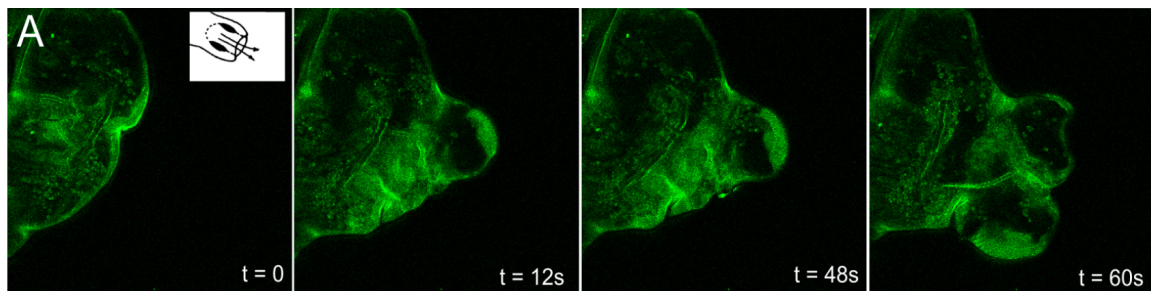
Host labs: IBDM, Marseille / IUSTI, Marseille

Supervision: Raphael Clément, Benoit Aigouy, Marie-Julie Dalbe & Joel Marthelot

During pupal development, the *Drosophila* head initially forms inside the larval body. A few hours after puparium formation, the head and eyes suddenly evert, emerging in less than a minute. Despite its critical role in shaping the adult head, this rapid morphogenetic transition remains essentially unstudied. Preliminary evidence suggests that eversion is driven by an increase in internal pressure that forces the head outward.

The aim of this internship is to establish a fundamental understanding of this morphogenetic event. We will use live imaging to quantify, for the first time, the morphometrics and dynamics of head eversion. Imaging will be carried out at IBDM, while complementary experiments at IUSTI will focus on live pressure measurements during eversion and characterization of tissue mechanics. By integrating kinematic analysis, mechanical measurements, and genetic perturbations, we seek to build a unified biophysical framework for understanding how hydraulic pressure drives head remodeling.

More broadly, head eversion represents a striking example of hydraulics-driven morphogenesis, a mechanism that enables extremely rapid, large-scale shape transformations of entire organs, yet remains a largely unexplored frontier in developmental biology.



Expected profile

We are looking for a motivated student who is excited by the interface of physical biology and developmental morphogenesis, and eager to engage in hands-on experimental work.

Future opportunities

This project is embedded in a new long-term research program, and motivated students will be actively encouraged and supported to pursue a PhD after the internship.

Scientific environment

The intern will benefit from multidisciplinary supervision (biology, biophysics, and mechanics) within a highly active and stimulating interdisciplinary environment in Marseille. They will also have access to the seminars and events of the Turing Center (CENTURI), a campus-wide initiative dedicated to interdisciplinary approaches in the life sciences.

Contact

raphael.clement@univ-amu.fr