

## **Masters Internship + PhD**

### **How much energy does it take to make an embryo?**

Team 'Quantitative Biology of Cells and Embryos'  
Team leader: Clotilde Cadart  
Institut Cochin

#### Project:

By quantifying how energy is transformed and supplied, bioenergetics allow to understand how available energy enables or constrain biological processes. These concepts are emerging as central to understand how the pace of development is set, the mechanisms regulating embryo growth but also the energetic cost of morphogenesis and how it is sustained by egg resources. **Our lab goal is to understand the fundamental processes affecting cellular and organismal energetics and how they impact the physiology and evolution of animals.** To do so, we leverage unique properties of *Xenopus* frog embryos where closely related species display robust variations in whole-embryo developmental rate or energy expenditure. These variations correlate with genome size across species and can be manipulated in the lab by altering genome copy number (i.e., ploidy) or generating hybrid embryos. We previously showed that increasing the ploidy of *Xenopus laevis* embryos results in a reduction of whole embryo energy expenditure which is due to ploidy-driven cell size increase and changes in cellular energetic needs (Cadart et al., *Current Biology*, 2023).

Following up on these findings, the proposed project will focus on better understanding the link among genome content and whole-embryo energetics. The project will rely on novel quantitative assays to measure embryo energy expenditure (calorimetry, oxygen consumption rate), live-imaging (confocal, multi-photon), comparisons and manipulations of embryos of *Xenopus* species (fertilizations, hybridizations, use of transgenic animals, micro-injections), data analysis, traditional molecular and developmental biology techniques.

#### More about the lab and team leader:

You will join a young and dynamic lab which enjoys pushing forward novel and ambitious questions about cellular and organismal energetics while working in a supportive and friendly environment.

<https://institutcochin.fr/equipes/biologie-quantitative-cellule-et-embryon>

<https://journals.biologists.com/dev/article/150/19/dev202373/330793/Pathway-to-Independence-an-interview-with-Clotilde>

To apply: send a CV and email with motivation to: [Clotilde.cadart@inserm.fr](mailto:Clotilde.cadart@inserm.fr)