Master Biologie Moléculaire et Cellulaire 'BMC',
Université Paris Cité - *UFR Sciences du Vivant*

Parcours : **Biologie et Développement Cellulaires 'BDC'**
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Fiche de Projet de Stage de M2, 2023-2024

Unité INSERM ou CNRS ou Université : Institut Jacques Monod **Intitulé Equipe : Cell Division & Reproduction** **ED d'appartenance : BioSPC** **Responsable de l'Equipe : Julien DUMONT**	**Responsable du Stage : DUMONT** **Contacts** Adresse :15 rue Hélène Brion 75013 Paris Email :julien.dumont@ijm.fr Tel :0157278018

Titre du projet : Centrosomal Meiosis in a Parthenogenetic Nematode

Résumé du Projet de Stage (en 300 mots maximum, mots clés en gras)

Oocytes of most species are devoid of **centrosomes**. Thus in many species, assembly of the zygotic spindle, after fertilization, involves a duplicated sperm-inherited centrosome, which is also crucial to set **embryonic polarity**. We found that, unlike in most species, in the parthenogenetic nematode ***Rhabditophanes diutinus***, centrosomes persist during oocyte meiotic divisions. One centrosome is maternally-transmitted to the zygote and, after duplication, forms the two poles of the **mitotic spindle**. By analyzing polarity determinants, we found that the maternally-inherited centrosome can, like its paternally-inherited counterpart, act as a **symmetry-breaking cue** and induce **zygotic polarization**.
To determine the mechanisms that drive **meiotic spindle assembly** in the presence of centrosomes, we will perform *in utero* live confocal imaging in *R. dutinus*. We will first develop a **transgenesis** approach to generate stably expressing fluorescent marker strains by adapting efficient *C. elegans* **CRISPR** genome editing methodologies. We will then combine **live imaging** in *R. dutinus* with RNAi-based depletion of key proteins important for centrosome function or for acentrosomal spindle self-assembly. This project should contribute to our general understanding of the mechanisms by which the genetic material is properly distributed during meiosis in oocytes. It is indeed of absolute importance to appreciate the true diversity of meiotic features in nature, by considering both well-characterized model organisms as well as undescribed non-model organisms.

Publications de l'équipe relatives au projet de stage (max 5)

1/ Macaisne N*, Bellutti L*, Laband K*, Edwards F*, Pitayu-Nugroho L, Gervais A, Ganeswaran T, Geoffroy H, Maton G, Canman JC, Lacroix B & Dumont J. Synergistic stabilization of microtubules by BUB-1, HCP-1 and CLS-2 controls microtubule pausing and meiotic spindle assembly. ***eLife***, 12:e82579. doi: 10.7554/eLife.82579 **(2023)**

2/ Cabral G, Laos T, Dumont J, & Dammermann A. Differential Requirements for Centrioles in Mitotic Centrosome Growth and Maintenance. ***Dev. Cell***, 50, (3):355-366 **(2019)**

3/ Laband K, Le Borgne R, Edwards F, Stefanutti M, Canman JC, Verbavatz J-M & Dumont J. Chromosome segregation occurs by microtubule pushing in oocytes. ***Nat Commun***, 14;8(1):1499 **(2017)**

4/ Gigant E*, Stefanutti M*, Laband K, Gluszek-Kustusz A, Edwards F, Maton G, Lacroix B, Canman JC, Welburn J & Dumont J. Inhibition of ectopic microtubule assembly by the kinesin-13 KLP-7^{MCAK} prevents chromosome segregation and cytokinesis defects in oocytes. ***Development***, 144(9):1674-1686, **(2017)**

1 page maximum SVP !