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

Parcours : **Biologie et Développement Cellulaires 'BDC'**
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Fiche de Projet de Stage M2, Année 2021-2022

Unité INSERM ou CNRS ou Université : **Institut Jacques Monod** **UMR-CNRS 7592** **Intitulé Equipe : Polarité et Morphogenèse** **ED d'appartenance : BioSPC** **Responsable de l'Equipe : Antoine GUICHET**	**Responsable du Stage : Véronique BRODU** **Contacts :** Adresse : **Institut Jacques Monod** **Bât.Buffon - 15 rue Hélène Brion** **5205 PARIS CEDEX 13 - FRANCE** Email : **veronique.brodu@ijm.fr** Tel : **+ 33 1 57 27 80 78**

Titre du projet : Charaterisation of the actin cytoskeleton and its functional importance in cell shape remodelling during tracheal system morphogenesis in *drosophila*

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

Epithelium remodelling is an essential mechanism for organogenesis during which cells change shape and positions while maintaining contact with each other. Similar mechanisms are used again during solid tumour invasion. **Adherens junctions** (AJs) mediate stable cohesion between cells but must be actively reorganised to allow morphogenesis. An essential component of AJ is the transmembrane protein E-Cadherin (E-Cad). Through its intracellular domain, E-Cad is associated in part with cytoskeletal elements of the **acto-myosin** and the **microtubule (MT) networks**. Both networks are highly dynamic and crucial for cell migration, cell deformation, cell adhesion and molecular transport.

To further uncover fundamental processes essential during **collective cell migration**, we study the formation of the respiratory or so called tracheal system in the *drosophila* embryo. The tracheal network is an excellent model system to explore, *in vivo* in a whole organism, cellular junction remodelling during **organ formation in 3D.**

After studying the contribution of the MTs, we now focus on the actin network and will address the followings points:

1- We will characterise the **dynamics of actin distribution** during tracheal morphogenesis using a range of *in vivo* markers and correlate this distribution to cell behaviour.

2- We have preliminary data indicating that different qualities of actin network (linear or branched networks) are differentially distributed according to the organization of cells within tracheal branches. We will further detail these **different actin subnetworks** and determine their functional importance.

3- We will determine the **actin functional requirement** during tracheal cell migration. To approach this question, we have established new tools to depolymerise the actin network *in vivo*. We will evaluate their effect on tracheal morphogenesis. Genetic experiments, cell imaging (conventional and high-resolution confocal microscopy) and quantitative image analysis will then be carried out to determine the importance of the actin cytoskeleton *in vivo*.

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

- Le Droguen P. M., Claret S., Guichet A. and **Brodu V**. (2015). Microtubule-dependent apical restriction of recycling endosomes sustains adherens junctions during morphogenesis of the Drosophila tracheal system. Development. 2015 142(2):363-74

- **Brodu V.** et al. (2010) A developmentally regulated two−step process generates a non−centrosomal microtubule network in *Drosophila* tracheal cells. Developmental Cell 18(5):790−801