# *Licence - Master Internship offer*

**Laboratoire d'accueil et Tuteur du stage / Host laboratory and Internship supervisor:**

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Equipe : Evolution et développement de la fleur (PI : Michiel Vandenbussche)

**Titre du projet de recherche / Research project title:**

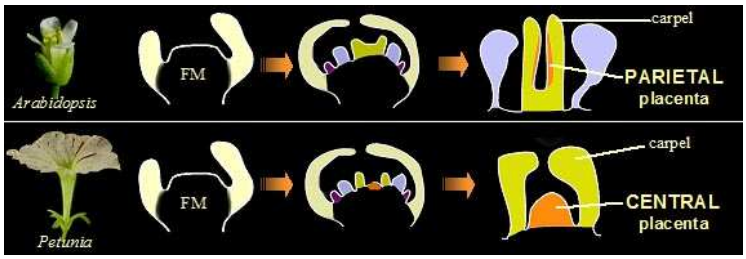
Control of Flower meristem termination and placenta development in Petunia

**Description du projet / Project description:**

Background

Flowers are the reproductive structure of angiosperms. They are - most of the time - composed of four distinct types of organs (sepals, petals, stamens and carpels), which develop on four concentric rings, or whorls. Each flower develops from a flower meristem (FM), which is itself produced by the shoot apical meristem (SAM). SAM and FM share many features and regulators. However, they display a major difference: while the SAM maintains stem cells in its centre and keeps producing new organs throughout the life of the plant, stem cells are only transiently maintained within the FM, which terminates once producing carpels, the female reproductive organs on the innermost whorl (see figure below).

Carpels enclose the ovules, which are produced by the placenta. Depending on species, the placenta is located along the wall of carpels, we talk about parietal placentation like in Arabidopsis for instance, or in-between carpels, on a central dome, and we talk about central placentation like in Petunia for instance (see figure below).




Schemes showing flower and placenta development in *Petunia* and *Arabidopsis*, which belong to central and parietal placentation types, respectively.

Research Proposal

We propose two projects:

- The first project addresses the molecular bases of the FM termination in Petunia. Interestingly, we isolated a mutant suggesting that mechanisms of FM termination would be different in Petunia as compared to Arabidopsis. However, before drawing any conclusions, we need a much better description of the mutant phenotype, and this is the subject of the proposal. The idea here is to challenge the hypotheses reported in Arabidopsis to date to evaluate whether mechanisms of FM termination in Petunia and Arabidopsis are conserved or not.
- The second project addresses the putative link between FM termination and placenta development. The idea is to evaluate whether the different types of placentation would result from differences in FM termination timing. This question will be addressed by measuring the expression levels of a series of molecular markers with respect to the stages of FM termination and placenta development.

Methods

Phenotyping, cloning, RT-qPCR, *in situ* hybridization, cytology. Depending on the project, these methods will be more or less developed.

**Publications du laboratoire (5 max) / Lab publications (5 max):**

- Prunet N., Morel P., Champelovier P., Thierry A.M., Negrutiu I., Jack T. and Trehin C. 2015. SQUINT promotes stem cell homeostasis and floral meristem termination in Arabidopsis through APETALA2 and CLAVATA signaling. J Exp Bot.
- Trehin C., Schrempp S., Chauvet A., Berne-Dedieu A., Thierry A.M., Faure J.E., Negrutiu I. and Morel P. 2013. QUIRKY interacts with STRUBBELIG and PAL OF QUIRKY to regulate cell growth anisotropy during Arabidopsis gynoecium development. Development, 140: 4807-4817
- Heijmans K, Ament K, Rijpkema AS, Zethof J, Wolters-Arts M, Gerats T, Vandenbussche M 2012. Redefining C and D in the Petunia ABC. The Plant Cell. 24: 2305-2317.
- Prunet N., Morel P., Negrutiu I. and Trehin C. 2009. Time to stop: flower meristem termination. Plant Physiology, 150: 1764-1772.
- Prunet N, Morel P., Thierry A.M., Eshed Y., Bowman J., Negrutiu I and Trehin C. 2008. The *REBELOTE*, *SQUINT* and *ULTRAPETALA1* genes function redundantly in the temporal regulation of floral meristem termination in *Arabidopsis thaliana*. The Plant Cell, 20: 901-919.