

Encontram-se abertas 3 candidaturas a estágios de Mestrado em *Biologia Celular e Biotecnologia* (ano lectivo 2010/2011), no Grupo Forest Biotech (ITQB/IBET, Oeiras). Pretendem-se candidatos com uma forte motivação e interesse em Investigação nas áreas de Biologia Molecular e Biotecnologia em Plantas.

Os Projectos de Mestrado (ver em baixo) terão a duração máxima de um ano. Os candidatos deverão enviar uma carta de apresentação, acompanhada de *Cv*, do qual deverão constar grau académico, classificação final e ano de conclusão.

Projectos de Mestrado em *Biologia Celular e Biotecnologia* (ano lectivo 2010/2011)

Projecto 1

Tema do Projecto: Molecular Analysis of Class III HD-Zip transcription factors and role in plant vascular development

Sumário do projecto: In eukaryotes, transcription of protein-coding genes is controlled by complex networks of transcription factors. In *Arabidopsis* model plant, the transcription factors family Class III homeodomain-leucine zipper (HD-Zip III) genes have been reported to regulate vascular development. In trees, the role of these transcription factors is still largely unknown. The aim of this project is to characterize the function of these genes in the provascular and vascular organization in the woody poplar plants using different molecular and cell biology approaches. The transcriptional regulation of vascular development in plants is a competitive area of study, with implications in the control of important developmental processes such as wood formation.

The experimental work will involve:

- *In vitro* and greenhouse growth of poplar and *Arabidopsis* plants;
- Over-expression and silencing of HD-Zip III genes in poplar and *Arabidopsis* plants;
- Confocal microscopy for analysis of vascular development

Orientador – Célia Miguel

Duração e carga horária - 6 meses a 1 ano, 35 horas semanais

Local de realização – Forest Biotech Laboratory, ITQB/IBET, Oeiras
(cmiguel@itqb.unl.pt)

Número de estagiários – 1

Projecto 2

Tema do Projecto: Functional studies of genes involved in maritime pine embryogenesis

Sumário do projecto: Most studies of plant embryogenesis have been conducted in angiosperms like the model plant *Arabidopsis* (Willemson e Scheres 2004, *Annu Rev Genet* 38:587–614). Despite the similarities in the embryogenesis of angiosperms and gymnosperms, the evolutionary divergence resulted in unique characteristics in the development of the embryo in both groups of plants. However, comparative molecular studies of embryo development in angiosperms and gymnosperms are still scarce (Cairney et al. 2006, *Plant Mol Biol* 62:485-501). In this project, the previously initiated functional

characterization of genes involved in the embryogenesis of the gymnosperm species *Pinus pinaster* will be continued using somatic embryogenesis as an experimental system.

The experimental work will involve:

- Preparation of constructs for manipulating gene expression in somatic embryos;
- Genetic transformation of embryogenic cultures;
- Phenotype characterization and molecular analyses of transformants

Orientador –Célia Miguel

Duração e carga horária - 6 meses a 1 ano, 35 horas semanais

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Número de estagiários – 1

Projecto 3

Tema do Projecto: Small RNAs in *Quercus suber* cork tissue

Small RNA molecules of about 20–30 nucleotides have emerged as powerful regulators of gene expression and genome stability [Moazed D, Nature (2009) 457, 413-420]. They function by guiding sequence-specific gene silencing at the transcriptional and/or post-transcriptional level. MicroRNAs (miRNAs) represent one of the major classes of small regulatory RNAs in plants and since the first discovery of miRNAs in *Arabidopsis* in 2002 [Reinhart BJ et al, Genes Dev. (2002) 16, 1616–1626], more than 700 plant miRNAs have been identified using different strategies.

Microarray miRNA expression profiling revealed the deep conservation of many plant miRNA families, with at least eight families conserved since before the emergence of seed plants [Axtell M and Bartel DP, Plant Cell (2005) 17, 1658–1673]. However, a majority of plant microRNA families have a different degree of divergence between species. It is believed that the diversity is necessary for plants to regulate various specific processes. Cork cambium (or phellogen) from cork oak is a lateral meristem that produces cork (phellem) with a unique composition and structure. This project will consist in the analysis of cork cambium/phellem regarding small RNAs content, in order to identify candidates conferring the tissue specificity to produce cork. The experimental work will involve:

- collection of phellem tissues from previously geo-identified cork oak trees
- optimization of protocols for small RNA isolation
- identification and expression analysis of specific small RNAs

Orientadores: Inês Chaves e Célia Miguel

Duração e Carga horária: 6 meses a 1 ano (35 horas semanais)

Local de realização: Forest Biotech Lab (ITQB/IBET)

Número de estagiários – 1