

## Proposta de plano de tese de Mestrado

**Laboratory:** Forest Biotechnology (iBET, ITQB NOVA)

**Title:** Characterization of *Arabidopsis* mutants altered in periderm formation

**Abstract:** When exposed to adequate environmental conditions, plants from the model species *Arabidopsis thaliana* exhibit secondary growth in the hypocotyl, that results from the activity of the secondary meristems (vascular cambium and cork cambium), similarly to what is observed in trees. The vascular cambium gives rise to the secondary phloem and secondary xylem (or wood). The cork cambium forms the periderm which includes the pheloderm and the phellem (or cork) tissues.

Cork is one of the most relevant renewable natural resources for the Portuguese economy. The developmental processes that underlie cork formation follow a sequence of events that start at the cork cambium, a stem cell niche that provides cells towards the external part of the stem (or root) which will differentiate into phellem or cork. The molecular mechanisms of specification and differentiation of these cells are far from being understood<sup>1</sup>.

Based on the resources available for gene functional analysis in *Arabidopsis* plants, and on the possibility of inducing secondary growth in this model species, this project aims at the characterization of *Arabidopsis* mutants in candidate genes involved in the cork cambium activity. A set of mutants with relevant phenotypes will be studied to identify new regulatory mechanisms involved in periderm formation. Based on the available literature and on previous results obtained in our lab (Chaves et al., 2014) candidate genes involved in auxin response will be targeted. The experimental work will involve: (1) growth of control and mutant plants of *Arabidopsis*; (2) application of hormonal treatments; (3) microscopy characterization of observed phenotypes; (4) gene expression analysis; (5) crossing with relevant marker lines.

**Supervision:** Célia Miguel

**Duration:** 9 months to 1 year

**Number of students:** 2

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### References and suggested reading:

1. Barra-Jiménez A and Ragni L (2017) Secondary development in the stem: when *Arabidopsis* and trees are closer than it seems. *Current Opinion in Plant Biology* 2017, 35:145–151
2. Chaves I, Lin Y-C, Pinto-Ricardo C, Van de Peer Y, Miguel CM (2014) miRNA profiling in leaf and cork tissues of *Quercus suber* reveals novel miRNAs and tissue-specific expression patterns. *Tree Genetics & Genomes* 10:721–737.