



## Proposition d'un sujet de stage au M2 ADAM (2018-2019)

Acceptez-vous que ce sujet soit proposé aux étudiants de l'itinéraire « Pro » ? oui

Titre	<p><b>Unravelling the molecular function of POQR, a plant oligopeptidase conferring quantitative resistance to <i>Sclerotinia</i> mold disease</b></p>
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Equipe(s)	Quantitative Immunity in Plants - Laboratoire des Interactions Plantes – Microorganismes (LIPM)
Résumé	<p>In our previous work, we used Genome Wide Association (GWA) mapping in <i>A. thaliana</i> natural populations to identify <b>genetic loci associated with QDR to the fungal pathogen <i>S. sclerotiorum</i></b>. The highest association value identified <i>At1g20380</i>, a gene encoding a putative prolyl-oligopeptidase induced upon inoculation that we renamed POQR (Prolyl-oligopeptidase involved in Quantitative Resistance). The <b>POQR oligopeptidase mediates QDR against <i>S. sclerotiorum</i> in <i>A. thaliana</i> and tomato</b>. <i>POQR</i> homologs are broadly conserved in Embryophytes, and are significantly induced upon <i>S. sclerotiorum</i> inoculation in five different plant species. <i>POQR</i> and its paralog are <i>A. thaliana</i> closest homologs to <i>Vaccaria hispanica</i> PCY1 macrocyclase, an enzyme responsible for the biosynthesis of the cyclic peptide segetalin A in Caryophyllaceae. However, the molecular mechanisms through which POQR mediates resistance to <i>S. sclerotiorum</i> remain to be determined.</p> <p>The objectives of the internship will be to 1) test for POQR macrocyclase activity using recombinant proteins, 2) perform a systematic search for POQR protein partners in <i>Nicotiana benthamiana</i> by co-immunoprecipitation, and 3) identify genes co-regulated with <i>POQR</i> through a global transcriptomic approach.</p> <p>Key experimental approaches will cover the field of protein biochemistry, confocal microscopy, plant pathology and bioinformatics. This work will contribute to the characterization of a novel plant defense pathway active against necrotrophic fungal pathogens.</p> <p>Badet <i>et al.</i> (2017) "Parallel evolution of the POQR prolyl oligopeptidase gene conferring plant quantitative disease resistance" Plos Genet. 13(12): e1007143</p> <p>Barber <i>et al.</i> (2013) "The two-step biosynthesis of cyclic peptides from linear precursors in a member of the plant family Caryophyllaceae involves cyclization by a serine protease-like enzyme" J. Biol. Chem. 288(18):12500-510</p>
Photo	<p><b>A</b></p> <p>The diagram illustrates the evolutionary path from an ancestral POP (blue box) to AtPOQR (green box) and SIPOQR (green box) in Arabidopsis. It shows lineage divergence, gene duplication, and convergent evolution. Gene expression levels are shown as green bars. Confocal microscopy images show Arabidopsis roots under control and silenced conditions, with scale bars in the bottom right of each image.</p>