PhD student and postdoc positions available at Plant Health Institute (PHIM), Montpellier, France

https://umr-phim.cirad.fr/en

Staring date: 1st of November, 2021

Project: **Small RNAs in plant-virus-insect vector interactions and trans-kingdom gene silencing**

Small (s)RNA-directed RNA interference (RNAi) plays an important role in epigenetic regulation of gene expression, antiviral defence and cross-talk between eukaryotic organisms. In this project we will dissect the biogenesis and function of sRNAs in 3-way plant-virus-insect vector interactions and exploit trans-kingdom RNAi mediated by mobile sRNAs to investigate molecular mechanisms underlying virus transmission by vectors and to interfere with the transmission process. To this end we will use two related legume viruses of family *Nanoviridae* and aphid vectors causing economically-important diseases worldwide. Based on available evidence, we hypothesize that mobile viral sRNAs, generated by plant RNAi and ingested by phloem sap-feeding aphids, penetrate into aphid cells and target genes, thereby regulating gene expression to facilitate the passage of viral particles throughout aphid body and inoculation of a new host plant. Likewise, virus-induced mobile plant sRNAs may regulate aphid gene expression in favour of virus transmission. Finally, the plant genes presumably targeted by viral or virus-induced plant sRNAs, or mobile aphid sRNAs may also have impact on virus acquisition by aphids and hence transmission. To test these hypotheses we will profile sRNA-ome, transcriptome and RNA degradome of plants and aphids fed on virus-infected and control legume plants. We will then use virus-induced gene silencing (VIGS) and exogenous RNAi approaches to (i) validate the role of virus-regulated and sRNA-targeted genes in virus acquisition and transmission by aphids and (ii) investigate molecular mechanisms underlying the circulation and persistence of viral particles in the aphid body. Our results would ultimately contribute to designing RNAi-based tools and other novel approaches to control aphid-borne diseases not only by killing insect vectors but also by interfering with virus transmission without impacts on vector viability/fitness that may force selection for insect resistance.

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We are looking for **candidates with skills in molecular biology and bioinformatics**

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