**Nodule-specific PLAT domain (MtNPD1) - dependent host-strain compatibility in the *Medicago truncatula* – *Sinorhizobium* sp. symbiosis**

Samara H, Pradhan R, Mehebub M S, Pant C, Pislariu C I

*cpislariu@twu.edu*

Division of Biology, Texas Woman’s University, Denton, USA

Symbiotic nitrogen fixation (SNF) is a complex process regulated by thousands of legume host and nitrogen fixing symbiont genes. Tobacco retrotransposon (*Tnt1*)-insertion mutagenesis has been instrumental in the discovery of new genetic controls of SNF in the model legume *Medicago truncatula*. A foward genetic screening identified the Nodule-specific Polycystin-1, Lipoxygenase, Alpha-Toxin (PLAT) Domain-encoding gene, *MtNPD1*, which is essential for root nodule development, survival of *Sinorhizobium* sp. inside infected cells, and efficient nitrogen fixation.

We previously reported that, in *npd1* nodules, *S. meliloti* Sm1021 fail to mature and undergo early senescence, while *S. meliloti* Rm41 differentiate and fix nitrogen, thus reversing the mutant phenotype into wild type. *MtNPD1* is predicted to play a role in facilitating or restricting effective nodulation in *M. truncatula* [1].

A systematic analysis of host strain compatibility using *Sinorhizobium* strains representing a range of secretion systems uncovered three *S. meliloti* strains that induce wild type-like nodules in *npd1*: Rm41, T073, and M10. In contrast, *S. meliloti* Sm1021 and *S. medicae* A321 and WSM419 induce deffective *npd1* nodules. A phenotype-informed pangenome analysis to identify relevant bacterial gene clusters will be discussed. Unique insights into paired transcriptional responses in the *MtNPD1*-mediated host-strain compatibility were gained by dual RNA-Seq. To facilitate the tracking of infections in single inoculations and in competition studies involving multiple strains, we developed a collection *Sinorhizobium* sp. strains constitutively expressing green-, red, cyan-, and yellow-fluorescent proteins. How reporters influence nodulation will also be discussed.

***References:***

[1] Pislariu C.I. et al. (2019) The nodule-specific PLAT domain protein NPD1 is required for nitrogen-fixing symbiosis, Plant Physiology, vol. 180, no. 3, p. 1480.