



"Dissecting Phytochrome Photosensory Signaling and Transcriptional Networks"

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Invited by Prof Dirk Inzé and Prof Frank Van Breusegem

Our research interests are in defining the mechanisms by which light signals are perceived and transduced by the phytochrome (phy)-PIF module to Direct-Target Genes (DTGs), focused specifically on the two sequential interfaces (a) between the phy and PIF proteins, and (b) between the PIFs and their DTGs. Existing data suggest that these components engage in dynamic multimolecular complexes comprised variously of (a) protein kinases (that include PPKs (Photoregulatory Protein Kinases)) and E3 ubiquitin ligases (including LRBs, EBFs and COP1-SPA), that sequentially phosphorylate and ubiquitinate the PIFs to regulate their abundance, and (b) a diversity of other interacting components that modulate the intrinsic transcriptional activation activity of the PIFs (including the core clock protein, TOC1). The data suggest yet greater complexity in the system, including potential mechanistic differences among the individual PIFs, as yet unidentified factors that may contribute to the signaling process, and transactors that may modulate PIF transcriptional regulatory capacity in situ at the genome interface, independently of the level of promoter occupancy. Our current efforts, using a combination of mass-spectrometric, biochemical, molecular genetic and genomic approaches to explore these possibilities will be described.