

**P011** Phosphate signalling in *Arabidopsis*  
Fan Lai and Peter Doerner

Phosphate (Pi) is an essential macronutrient in plants, but little is known about the pathways involved in Pi sensing and responses. Using gene expression responses, we first aimed to identify primary response genes to the perception of phosphate in Pi starved plants and cell cultures. We examined the expression of the high-affinity phosphate transporter *Pht1;1*, the monogalactosyl-diacylglycerol synthase *MGD3* and the putative ribo-regulator *At4*. Changes in *Pht1;1* transcript abundance are a primary response to the perception of Pi that do not require *de novo* protein synthesis, while sustained changes in *MGD3* RNA abundance and changes in *At4* expression require protein synthesis. Treatment of *Arabidopsis* suspension cultures with the protein synthesis inhibitor cycloheximide (CHX) alone show that *Pht1;1* and, in part, *MGD3* expression are controlled by a labile repressor, with kinetics that suggest that the stability of the repressor is dependent on the perception of phosphate. This raised the possibility that regulated protein stability is a crucial mechanism that couples phosphate perception to downstream responses. Treatment of suspension cultures with proteasome inhibitors, but not with protease inhibitors that do not inhibit the proteasome, affects the abundance of *Pht1;1* transcripts, further supporting the above hypothesis.

Based on our results, we propose a conceptual spatio-temporal framework for the function of plant phosphate signalling pathways.