A long standing partnership? – W-boxes and their WRKY companions

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WRKY proteins are a class of transcription factors that are specific to the plant kingdom. Their WRKY domain, a 60 amino acid region, is conserved between all known members. It has been shown that the invariant amino acid sequence WRKYGQK and the C-terminal zinc-finger-like motif are essential for binding to a conserved promotor element, the W Box, with its consensus sequence (T)TGAC(C/T) [1].

WRKY proteins are thought to play an essential role in senescence, wounding, stress and pathogen-triggered signal transduction. Their W-box binding motif was found to be significantly more frequent in a -1.1 kb region upstream of the ATG in the pathogen responsive PR1-regulon of Arabidopsis compared to a non responsive control promoter set [2]. Furthermore, single W-boxes, both in synthetic and natural promotor-reporter gene fusions, were shown to be sufficient to drive specific WRKY dependent expression [3,4]. Thus WRKY protein W-box interactions were found to be functionally important steps in senescence and stress responses conserved throughout higher plant families.

16 different WRKY gene fragments have been obtained from *Physcomitrella patens* demonstrating that WRKY genes belong to an essential subset of plant genes dating back at least 350 million years in time. We could show that in heterologous expression experiments the W-boxes from Arabidopsis and parsley are functional in Physcomitrella protonema.

As genomic sequence information of mosses is sparse, nothing is known so far about W-box frequency, distribution and function. We address the questions whether PpWRKYs also bind to the same motif that is invariant other plants and moreover, if they are involved in the same conserved signal transduction pathways?

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3. Robatzeck and Somssich (2002): Targets of AtWRKY6 regulation during plant senescence and pathogen defense. Genes Dev. 2002 May 1;16(9):1139-49.
4. Ruston *et al*. (2002): Synthetic plant promoters containing defined regulatory elements provide novel insights into pathogen- and wound-induced signalling. Plant Cell. 2002 Apr;14(4):749-62.