Title: The function of glycine rich RNA-binding proteins (GRPs) in the ABA-mediated responses of Arabidopsis thaliana

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Abstract: The class IV glycine-rich RNA-binding proteins are unique members of the heterogeneous superfamily of glycine-rich proteins (GRPs) and contain an RNA-binding domain in the N-terminus in the form of an RNA-recognition motif (RRM). This is followed by a C-terminal glycine-rich domain. Growing evidence suggests that these proteins (in particular AtGRP2 and AtGRP7) play key roles in the adaptation of plants to biotic and abiotic stresses including those resulting from pathogenesis, alterations in the osmotic, saline and oxidative environment and changes in temperature; all factors which are key agronomic and environmental considerations in a period of climatic change when global food security is of paramount importance. Evidence would suggest that, in plants, these GRPs operate as key molecular components of abscisic acid (ABA)-regulated development (e.g. seed germination and plant growth under conditions of drought) and work by regulating gene expression at multiple levels by altering mRNA storage and availability and by modifying the alternative splicing of mRNAs, mRNA export, mRNA translation and mRNA degradation.

In collaboration with Dorothee Staiger from the University of Bielefeld we have been investigating the molecular mechanisms by which these GRPs coordinate ABA-mediated, redox-dependent responses in plants and algae, but much further research effort is required to elucidate the protein-based hormonal and redox signalling connections that regulate their function and to determine which mRNAs they act upon. The aim of this project would then be to continue in this collaboration and to use both mutant and transgenic approaches along with a range of physiological, biochemical and molecular techniques to further our understanding in this respect and to provide an avenue for crop improvement in a changing environment.