Figure 1. Ribben drawing of the 1-Cys peroxiredoxin 6 from Anabeana (AnPrx6). The active site Cys-sulfonic acid residue is shown as sicks. Note, the alpha helical turn (purple) that connects helix-4 and strand-6 is only present in one monomer.

Keywords: Peroxiredoxin, 1-Cys Prx6, chaperone, asymmetric dimer, moonlighting,

MS12-P17 The solution structure of Sr33 challenges paradigms for coiled-coil domain dimerization in plant NLR immunity receptors

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Plants utilize intracellular immunity receptors, known as NLRs (nucleotide-binding oligomerization domain-like receptors) to recognize specific pathogen effector proteins and induce immune responses. These proteins provide resistance to many of the world's most destructive plant pathogens, yet we have a limited understanding of the molecular mechanisms that lead to defense signaling. We examined the wheat NLR protein Sr33, which is responsible for strain-specific resistance to the wheat stem-rust pathogen, *Puccinia graminis f. sp. tritici*. We present the solution structure of a coiled-coil fragment from Sr33, which adopts a four-helix bundle conformation. Unexpectedly, this structure differs from the published dimeric crystal structure of the equivalent region from the orthologous barley powdery mildew resistance protein, MLA10, but is similar to the structure of the distantly related potato NLR protein, Rx. We demonstrate that these regions are in fact largely monomeric and adopt similar folds in solution in all three proteins, suggesting that the CC domains from plant NLRs adopt a conserved fold. However, larger C-terminal fragments of Sr33 and MLA10 can self-associate both *in vitro* and *in planta* and this self-association correlates with their cell death signaling activity. The minimal region of the CC domain required for both cell death signaling and self-association extends to amino acid 142, thus including 22 residues absent from previous biochemical and structural protein studies. These data suggest that self-association of the minimal CC domain is necessary for signaling but that this is likely to involve a different structural basis than previously suggested by the MLA10 crystallographic dimer.

Keywords: Plant innate immunity, resistance (R) protein, coiled coil (CC) domain,nucleotide-binding oligomerization domain (NOD)-like receptor (NLR), effector-triggered immunity (ETI)