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Adapting to the cold

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Plants have evolved a number of cold-response genes encoding proteins that induce tolerance to freezing, alter water absorption and initiate many other low temperature induced processes. In the 1 April *Genes and Development*, Jian-Kang Zhu and colleagues of the Department of Plant Sciences, University of Arizona, shed light on how these genes are regulated.

Lee *et al.* report that the protein HOS1 negatively regulates cold-response genes in *Arabidopsis*. At low temperatures, HOS1 relocates from the cytoplasm to the nucleus where it regulates gene expression; *hos1* mutants show an excessive induction of cold-response genes. The *HOS1* gene was mapped to chromosome II of *Arabidopsis* and cloned. It encodes a protein of 915 amino acids with a nuclear localization signal and a RING finger. Proteins with this motif have been implicated in the breakdown of other proteins by a process that involves ubiquitination.

Lee *et al.* speculate that HOS1 might regulate the function of cold-response genes by targeting the gene products for degradation.

References

1. Lee H, Xiong L, Gong Z, Ishitani M, Stevenson B, Zhu JK: The *Arabidopsis HOS1* gene negatively regulates cold signal transduction and encodes a RING finger protein that displays cold-regulated nucleo-cytoplasmic partitioning. *Genes Dev* 2001, 15., [<http://www.genesdev.org/>]
2. Department of Plant Sciences, University of Arizona, [<http://ag.arizona.edu/pls/>]