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## **Athb-12, A Homeobox-Leucine Zipper Domain Protein from *Arabidopsis thaliana*, Increases Salt Tolerance in Yeast by Regulating Sodium Exclusion**

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An *Arabidopsis* cDNA clone that encodes Athb-12, a homeobox-leucine zipper domain protein (HD-Zip), was isolated by functional complementation of the salt-sensitive phenotype of a calcineurin (CaN)-deficient yeast mutant (*cnbD*, regulatory subunit null). CaN, a Ca<sup>2+</sup>/calmodulin-dependent protein phosphatase, regulates Na<sup>+</sup>-ion homeostasis in yeast. Expression of Athb-12 increased salt tolerance but not osmotic stress tolerance of these *cnbD* cells. Furthermore, expression of two other HD-Zip from *Arabidopsis*, Athb-1 and 7, did not suppress salt sensitivity of *cnbD* cells. These results suggest that Athb-12 specifically functions in Na<sup>+</sup>-ion homeostasis in yeast. Consistent with these observations, expression of Athb-12 in yeast turned on transcription of the NaCl stress-inducible PMR2A, which encodes a Na<sup>+</sup>/Li<sup>+</sup> translocating P-type ATPase, and decreased Na<sup>+</sup> levels in yeast cells. To investigate the biological function of Athb-12 in *Arabidopsis*, we performed northern blot analysis. Expression of Athb-12 was dramatically induced by NaCl and ABA treatments, but not by KCl. *In vivo* targeting experiments using a green fluorescent protein (GFP) reporter indicated that Athb-12 was localized to the nucleus. These results suggest that Athb-12 is a putative transcription factor that may be involved in salt stress responses in plants.