

W0157

**Plant L-asparaginase and its Relation to Human and Bacterial Cousins.** M. Jaskolski<sup>ab</sup>, K. Michalska<sup>a</sup>, G. Bujacz<sup>bc</sup>, <sup>a</sup>Dept. of Crystallography, A. Mickiewicz Univ., Poznan, Poland; <sup>b</sup>Center for Biocrystallographic Res., IBCh, Pol. Acad. Sci., Poznan, Poland; <sup>c</sup>Faculty of Biotech. & Food Sci., Technical Univ. of Lodz, Poland.

L-Asparaginases hydrolyze the  $\beta$ -amide bond of asparagine, releasing aspartate and ammonia. In plants, asparaginases are essential in nitrogen circulation, which uses L-asparagine as the main vehicle. *E. coli* expresses a protein (EcAIII) with sequence similarity to the plant enzymes. We have shown that EcAIII and its lupine counterpart (LIA) are more active as isoaspartyl aminopeptidases. This dual activity is crucial in seeds for removal of  $\beta$ -aspartyl aberrations during storage and for quick nitrogen release during germination. The crystal structure of LIA confirms the classification of plant asparaginases in the family of Ntn-hydrolases. The  $\alpha$ - and  $\beta$ -subunits of the mature  $(\alpha\beta)_2$  enzyme arise from autoproteolysis of a precursor protein. The T193 nucleophile at the N-terminus of subunit  $\beta$  is part of an active site that is similar to that of EcAIII. A Cl<sup>-</sup> ion marks the position of the  $\alpha$ -carboxylate group of the L-aspartyl substrate/product. An Na<sup>+</sup>-binding loop is necessary for proper positioning of the components of the active site. LIA is structurally similar to threonine aspartase and provides clues about Na<sup>+</sup> and Cl<sup>-</sup> binding by this leukemia-related enzyme.