

Structural analysis of chloroplast tail-anchored membrane protein recognition by ArsA1

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Abstract

In mammals and yeast, tail-anchored (TA) membrane proteins destined for the post-translational pathway are safely delivered to the endoplasmic reticulum (ER) membrane by a well-known targeting factor, TRC40/Get3. In contrast, the underlying mechanism for translocation of TA proteins in plants remains obscure. We present crystal structures of algal ArsA1 (the Get3 homolog) in a distinct nucleotide-free open state and bound to adenylyl-imidodiphosphate. This approximately 80-kDa protein possesses a monomeric architecture, with two ATPase domains in a single polypeptide chain. It is capable of binding chloroplast (TOC34 and TOC159) and mitochondrial (TOM7) TA proteins based on features of its transmembrane domain as well as the regions immediately before and after the transmembrane domain. Our data provide insights into the molecular basis of the highly specific selectivity of interactions of algal ArsA1 with the correct sets of TA substrates before membrane targeting in plant cells.