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SAXS studies reveal an I-Shaped Dimers of a Plant Chloroplast FOF1-ATP Synthase in Response to Changes in Ionic Strength

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F-type ATP synthase is a large protein complex that synthesizes ATP from ADP and phosphate. It plays a key role in the bioenergetics of any organism. There are three classes of F-type ATP synthase: bacterial, chloroplast, and mitochondrial. Despite significant structural similarities, there are also significant differences between different ATP synthases. Specifically, mitochondrial ATP synthases function as dimers or higher-order oligomers, while chloroplast ATP synthases typically exist as monomers, except for a small ~15% oligomeric fraction.

We have isolated and purified ATP synthase from spinach chloroplasts and investigated its in vitro dimerization process. Structural data obtained using SAXS indicate the dimerization of ATP synthase depending on the ionic strength of the solution. The model that best describes the SAXS data is an I-shape dimer with contacts through the delta subunit. The possible physiological role of chloroplast ATP synthase dimerization is discussed.

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