Heterologous Overexpression of Membrane-Anchored Subunit II of Spinach Chloroplast ATP Synthase and Its Detergent-Free Purification as a Soluble Protein*

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Subunit II is one of the four nonidentical subunits of the membrane integral, proton-transporting moiety (CFₐ) of the chloroplast ATP synthase. In chloroplasts of spinach leaves, it is the only nuclear-encoded CFₐ subunit. It has been deduced that CFₐII is not an additional subunit typical for photosynthetic organisms with no counterpart in E. coli, but equivalent to E. coli subunit b (Tiburzy, H.-J. and Berzborn, R. J. (1997), Z. Naturforsch. 52c, 789–798). Heterologous expression of subunit II was achieved by using the bacterial expression vector pT7-7. Recombinant subunit II (IIrec) does not integrate into the bacterial membrane nor does it precipitate into inclusion bodies. Gel filtration chromatography indicates that IIrec forms higher order aggregates. In three chromatographic steps approx. 10 mg of soluble IIrec of electrophoretic homogeneity are obtained from one liter of bacterial culture without using detergents. Thus, a eukaryotic membrane-anchored protein has been overexpressed in E. coli and has been purified in a soluble form.

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