

ENGINEERING THE SUNFLOWER RUBISCO SUBUNITS INTO TOBACCO CHLOROPLASTS

- New Considerations

1ST INTERNATIONAL SYMPOSIUM ON CHLOROPLAST BIOENGINEERING

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In higher plants, Rubisco's eight identical large subunits are encoded by the *rbcL* gene on the plastome, while the eight small subunits are encoded by a nuclear *RbcS* multigene family.

Maximal function requires perfect complementarities between the large and small subunits; interspecific subunit hybrids are to date invariably impaired catalytically. By transforming the genome of tobacco chloroplasts biolistically we have found that when the tobacco *rbcL* gene was replaced with the sunflower counterpart, a hybrid Rubisco assembled consisting of sunflower large subunits and tobacco small subunits.

Curiously the catalytic rate and substrate affinity of the hybrid Rubisco was found to mirror that of the Sunflower holoenzyme enabling the hybrid enzyme to support photoautotrophic growth of the tobacco-sunflower transformants at ambient levels of CO₂. We have evidence that shows this hybrid enzyme is compatible with the tobacco Rubisco regulatory enzyme; Rubisco activase. Physiological and biochemical characterisation of photosynthesis and growth by these plants and the impact this might have on future strategies in the engineering of Rubisco subunits within tobacco chloroplasts will be presented.

