carried out in two stages: the photoreduction of ferredoxin-reducing substance followed by the dark reduction of NADP (or ferredoxin) by photo-reduced ferredoxin-reducing substance.

The reaction partner for the photoreduction of ferredoxin-reducing substance is the specialized form of chlorophyll *a*, chlorophyll *P*-700. After a 1 ns flash to oxidize chlorophyll *P*-700 to chlorophyll *P*-700*, the dark kinetics of the reduction of chlorophyll *P*-700* are consistent with this reaction scheme.

Additional information on the characteristic potential, amino acid composition and other properties of ferredoxin-reducing substance will be presented.

Biosynthesis of Fatty Acids by Isolated Chloroplasts

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Because of the importance of lipids in the structural components of chloroplasts in higher plants, studies on the biosynthesis of these compounds will provide a better understanding of the functional properties of the organelles.

Since the discovery by Smirnov (1960) of the capacity of chloroplasts to synthesize fatty acids from acetate, a number of investigators have extended our knowledge in this area. At present, isolated class I spinach chloroplasts (with intact outer envelope) readily incorporate [¹⁴C]acetate into palmitate and oleate in the presence of ATP, CoA, Mg²⁺, CO₂ and light (Stumpf *et al.*, 1967). In the absence of light, little if any synthesis occurs. When Triton X-100 or one of a number of other detergents is added to the reaction at very low concentrations, a large increase in fatty acid synthesis occurs as well as a marked increase in the formation of oleate. This effect is reversed specifically by increasing the concentration of ATP, which lowers the rate of synthesis as well as the extent of desaturation (Stumpf & Boardman, 1970). Further studies revealed that the site of regulation of Triton X-100 and ATP is at the C₁₆ → C₁₈ elongation step (Givan & Stumpf, 1971) and is not directly related to the desaturation reaction.

Very recently we have detected rather significant accumulation of acyl thiol esters in intact chloroplasts formed *de novo* from [¹⁴C]acetate. These acyl thiol esters have a fivefold higher amount of unsaturated acyl components than do the oxygen esters, suggesting that desaturation takes place on an acyl thiol ester level. Also present in chloroplasts are acyl-CoA synthetases, acyl-CoA hydrolase and transacylases (C. G. Kannagara & P. K. Stumpf, unpublished work). The interaction of these and other

enzymes in the biosynthetic capacity of isolated chloroplasts will be further described.

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The Sulphoglycolytic Pathway in Plants

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The ubiquity of sulpholipid in green plants and of sulphopropanediol in all diatoms implies the existence of biodegradative pathways for such compounds. Martelli & Benson (1964) have outlined the terminal portions of the pathway for bacterial degradation of sulphoquinovose (6-deoxyglucose-6-sulphonate). Martelli & Souza (1970) established the ultimate conversion into glyoxylate-sulphite addition product followed by production of sulphate ion.

In experiments with intact leaves of alfalfa (*lucerne*; *Medicago sativa*) and the coral tree (*Erythrina crista-galli*) we have observed that glycerol sulphoquinovoside is readily degraded whereas sulphoquinovose is relatively resistant. Sulpholactaldehyde, sulpholactate, sulphopropanediol, analogues of glyceraldehyde 3-phosphate, 3-phosphoglycerate and glycerol 1-phosphate were identified among the intermediates. The first step appears to be a phosphorolysis of glycerol sulphoquinovoside, since free sulphoquinovose was only slowly metabolized by any system yet examined. Hydrolysis of glycerol sulphoquinovoside would be expected to yield appreciable concentrations of sulphoquinovose since the observed rate of degradation of the latter was relatively low.

A striking difference was observed between the metabolism of glycerol [³⁵S]sulphoquinovoside by leaves of alfalfa and the Indian shrub *Erythrina*. The major compound produced by *Erythrina* was sulphoacetate, analogue of phosphoglycollate. Alfalfa and other plants produced first sulpholactaldehyde and then, after about 24 h, sulpholactate. Sulphate ion appeared slowly thereafter. We presume that *Erythrina* leaves utilize the sulphoglycolytic pathway but possess a more active system for decarboxylating sulpholactate than do most plants. The alkaloids of *Erythrina* bark are esters of sulphoacetate (Folkers, 1944; Mondon, 1970). Massive accumulation of sulpholactate in spores of *Bacillus subtilis* was observed by Bensen *et al.* (1969). Relative activities of enzymes in the sulphoglycolytic pathway determine