sensitive split-beam spectrophotometer and of ferrieyanide-ferrocyanide mixtures as redox buffers. For cytochrome-559 in pea chloroplasts a value of $E'_0 + 0.37$ v (25°) was obtained at both pH 6.5 and 7.5. The characteristic potential of potassium ferrieyanide was assumed to be $+0.43$ v. For cytochrome *f* a value for E'_0 of $+0.35$ v was obtained with both pea chloroplasts (pH 7.5) and etiolated barley plastids (pH 6.5). This value for bound cytochrome *f* is in good agreement with that obtained by Davenport & Hill (1952) for the soluble component ($E'_0 + 0.365$ v).

The remarkably high potential of cytochrome-559 suggests its possible role as a donor to P-700. It is incompatible with the suggestion that its position in the electron transport chain is close to photosystem 2 (Bendall & Hill, 1968).

Work is in progress on the measurement of the potential of cytochrome *b₆* in chloroplasts. Observations on the kinetics of reduction of cytochrome *b₆* by dithionite have shown that it is a complex of at least two components with α -bands at 559 and 563 m μ respectively. Neither of these components can be reduced by ascorbate. Thus chloroplasts contain two cytochromes with α -peaks at 559 m μ , but these differ in potential by about 350 mv.

I am indebted to the Science Research Council for purchase of the split-beam spectrophotometer.

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Reversed Electron Transport in Mitochondria from the Spadix of *Arum maculatum*

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A dramatic feature of the flowering process in *Arum maculatum* is a sharp increase in the rate of respiration of the sterile portion of the spadix as the spathe opens. The rapid respiration, which is completely resistant to inhibition by mm-cyanide (James & Beevers, 1950), leads to an increase in temperature of the tissue of the order of 10° above ambient. Mitochondria isolated from the tissue are similarly resistant to cyanide, and contain, in addition to a normal cytochrome oxidase system, a cyanide-resistant oxidase that is as yet unidentified (Bendall & Hill, 1956; Bendall, 1958; D. S. Bendall, B. T. Storey & W. D. Bonner, unpublished work). It has generally been supposed that the cyanide-resistant pathway represents a non-phosphorylating bypass to the normal respiratory chain and therefore is of special importance in the generation of heat. We have been unable to detect phosphorylation during the oxidation of either succinate or malate.

Recent experiments with double-beam and split-beam spectrophotometers in which we studied the kinetics of reduction of cytochromes have shown that these mitochondria do retain some energy-linked functions. In the aerobic steady state with cyanide present cytochromes *a* and *c* were only partially reduced by succinate. Addition of uncoupler allowed complete reduction, which suggested that reversed electron transport occurs rather than inhibited forward transport. This idea was confirmed by the following type of experiment. Addition of ascorbate and *NNN'*-tetramethyl-*p*-phenylenediamine in the presence of cyanide caused complete reduction of cytochrome *a* and *c* components. Subsequent addition of succinate or malate caused partial oxidation of cytochromes *a* and *c* and partial reduction of cytochrome *b*, a state that persisted until the suspension went anaerobic. The reoxidation was prevented by uncoupling concentrations of carbonyl cyanide *p*-trifluoromethoxyphenylhydrazone or 2,4-dinitrophenol added immediately before succinate. A high concentration of ADP was not inhibitory, and reoxidation could not be obtained with ATP replacing succinate or malate.

These observations suggest that the cyanide-resistant pathway is capable of driving electron transport against the thermochemical gradient from cytochrome *c*, although the mitochondria have lost the normal ability to interact with ADP and ATP.

We are indebted to the Science Research Council for purchase of the split-beam spectrophotometer, to Dr A. P. Dawson for help with the double-beam experiments and to the Guggenheim Memorial Foundation for a fellowship to W.D.B.

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The Amino Acid Sequence of Cytochrome *c₃* from *Desulfovibrio vulgaris* (N.C.I.B. 8303)

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Cytochrome *c₃*, discovered and purified by Postgate (1956), is found in *Desulfovibrio vulgaris* (Postgate & Campbell, 1966) and other species of sulphate-reducing bacteria. It is similar to the cytochromes *c* of higher organisms in spectrum and molecular weight, but has a very low redox potential (-0.205 v) and has two haem groups per molecule. The amino acid composition of the protein has been determined (Coval, Horio & Kamen, 1961) and the terminal groups have been identified (Bruschi-Heriaud & Le Gall, 1967).

The amino acid sequence of the protein from