tensive swelling ensues when diphenyleneiodonium is added to mitochondria suspended in 150mM-ammonium chloride, and this is not influenced by antimycin and rotenone.

This swelling can be explained by postulating that diphenyleneiodonium forms lipid-soluble complexes with Cl^- and with OH^- that can shuttle across the inner mitochondrial membrane and react:

(where DPI represents diphenyleneiodonium), permitting the transfer of external Cl^- into the inner space in exchange for OH^- , and thus acting as a Cl^- - OH^- antiporter. External NH_4^+ dissociates into H^+ and NH_3 , and the lipid-soluble NH_3 diffuses into the inner space, where it gives NH_4^+ and OH^- . In the presence of diphenyleneiodonium this OH^- formed internally then exchanges for external Cl^- and reacts with H^+ formed externally. There is therefore a net transfer of ammonium chloride into the inner space, and water follows, causing swelling. Diphenyleneiodonium also causes rapid swelling of mitochondria in 150mM-ammonium bromide and in 150mM-ammonium thiocyanate but not in solutions of 11 other ammonium salts tested.

Diphenyleneiodonium only causes rapid swelling of mitochondria in 150mM-potassium chloride (containing antimycin and rotenone), made permeable to K^+ by gramicidin, when 20 μM -2,4-dinitrophenol is also added. 2,4-Dinitrophenol is an H^+ uniporter and would be unnecessary if diphenyleneiodonium were a simple anion uniporter. This requirement implies that entry of Cl^- is compulsorily coupled to exit of OH^- and that 2,4-dinitrophenol allows rapid influx of Cl^- by permitting an efflux of H^+ equivalent to that of OH^- (see Selwyn, Dawson, Stockdale & Gains, 1970).

Selwyn *et al.* (1970) reported that some trialkyltin compounds are also Cl^- - OH^- antiporters and cause extensive swelling of mitochondria in ammonium chloride solutions. Both trialkyltin compounds and diphenyleneiodonium therefore provide models for specific anion carriers in membranes.

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The Isolation of Acidic Nuclear Proteins from *Physarum polycephalum*

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Non-histone acidic proteins are closely associated with DNA of nucleated cells (Stedman & Stedman, 1944, 1947; Mirsky & Pollister, 1946). The acidic proteins have a higher turnover rate than the histones (Daly, Allfrey & Mirsky, 1953; Steele & Busch, 1963). These acidic proteins probably participate in the nuclear processes of DNA replication and transcription. We have begun an examination of the acidic nuclear proteins of the slime mould *Physarum polycephalum*. This mould, when grown on filter paper saturated with semi-defined medium (Daniel & Baldwin, 1964), is a multicellular plasmodium up to 10cm in diameter containing millions of nuclei in a common cytoplasm. All the nuclei are precisely synchronous in their nuclear processes. This organism provides a very convenient experimental situation for the analysis of the processes of growth and division.

The organism was grown on semi-defined medium in the micro-plasmodial form (Daniel & Baldwin, 1964); nuclei were isolated and purified (Mohberg & Rusch, 1964). The histones were extracted with 1M-calcium chloride (Mohberg & Rusch, 1969). The nuclei now contained mainly DNA and non-histone protein; they were further extracted several times with cold 1M-sodium chloride and then with cold ethanol and cold acetone, and finally dried under vacuum over phosphorus pentoxide. The dried residue was extracted with 0.02M-lysine buffer, pH 11.6, which contained 4M-urea (deionized and 1M-sucrose (Benjamin & Gellhorn, 1968). This extract was analysed by polyacrylamide-gel electrophoresis by method 1 of Benjamin & Gellhorn (1968). The gels were subjected to electrophoresis for 3-4h and were then stained with 0.5% (w/v) Amido Black for 40-60min and destained with several washes of 7% (v/v) acetic acid. Seven well-defined bands were visible, of which three were more prominent than the remainder. These were all very acidic proteins, since no separation occurred at pH 2, 4 or 7, and at pH 9 the separation was very poor.

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