Isolation of 2-Demethylphytylplastoquinone from *Euglena gracilis*

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White (1971), while investigating the synthesis of plastoquinones, tocopherols, tocopherolquinones and ubiquinones by a streptomycin-bleached strain of *Euglena gracilis* strain Z, isolated from this organism a quinone with the chromatographic and u.v.-spectral properties expected for a phytyltoluquinone. The quinone was also found to be present in autotrophically grown *E. gracilis* strain Z; however, the amount formed by the normal strain (3 µg/g dry wt.) is less than that produced by the bleached strain (7 µg/g dry wt.).

In the present communication we report on the characterization of this quinone as 2-demethylphytylplastoquinone (3-phytyltoluquinone).

The lipid was extracted from freshly harvested cells (10g dry wt.) of the bleached strain by the method of Threlfall & Goodwin (1967), and then chromatographed on a column of Brockmann grade III acid-washed alumina developed by stepwise elution with light petroleum containing increasing amounts of diethyl ether (Whistance, Threlfall & Goodwin, 1967). The 2-demethylphytylplastoquinone (70 µg), present in the fraction eluted from the column of 0.25% diethyl ether in light petroleum, was purified by t.l.c. on (i) silica gel G developed with benzene-light petroleum (2:3, v/v) (R_F 0.3), (ii) paraffin-impregnated silica gel G developed with aq. 90% (v/v) acetone (R_F 0.5) and (iii) silica gel G developed with benzene (R_F 0.45).

The identity of the 2-demethylphytylplastoquinone was established as follows. (1) Its u.v. spectra in cyclohexane (λ_{max} 251.5nm) and ethanol (λ_{max} 252nm, changing to λ_{max} 289nm after sodium borohydride treatment) were those expected for a phytyltoluquinone. (2) Its mass spectrum showed peaks at m/e 400 (M) and 175 (base peak). (The latter proves that the quinone contains a monoprenyltoluquinone unit.) (3) Its monomethyltocol, synthesized by the same sequence of reactions as those used to form γ -tocopherol from phytylplastoquinone (Whistance & Threlfall, 1970), was found to have the same t.l.c. properties as δ -tocopherol. [This establishes that the quinone is 2-demethylphytylplastoquinone and not 3-demethylphytylplastoquinone (4-phytyltoluquinone) or 6-phytyltoluquinone.]

In biosynthetic terms the occurrence of 2-demethylphytylplastoquinone is of obvious interest, since its reduced form (2-demethylphytylplastoquinol) can be envisaged as an intermediate on the

pathways leading from homogentisic acid to phytylplastoquinone and phytylplastohydroquinone monomethyl ether and to the tocopherols and their oxidation products, the tocopherolquinones (Threlfall & Whistance, 1971).

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Propionate Resistance in Blue-Green Algae

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Sodium propionate has an inhibitory effect on the growth of a variety of bacteria and moulds (Wolford, 1945). Recent investigations of the ability of blue-green algae to assimilate organic compounds have revealed that the growth of these organisms is also sensitive to sodium propionate (Hoare, Hoare & Moore, 1968; A. J. Smith, J. London & R. Y. Stanier, unpublished work) and that acetate specifically reverses the effect of propionate (Hoare *et al.* 1968).

Anacystis nidulans and *Gloeocapsa alpicola*, two unicellular blue-green algae, are sensitive to low concentrations of propionate; concentrations above 0.5mM completely inhibit growth. In both cases the inhibitory effect of 5mM-propionate is reversed by an equimolar amount of acetate. The growth-inhibitory effect of sodium propionate is not permanent; with both organisms growth in media containing propionate (5mM) recommences after a lag of 50–60 h. The organisms in a culture that has recovered from the inhibitory effect of propionate are propionate-tolerant, since on transfer to salts media with or without propionate (5mM) they grow without a lag and at about the same rate as do propionate-sensitive organisms. Propionate-tolerant strains of both organisms have been isolated by plating sensitive organisms on salts-agar containing sodium propionate (5mM). These tolerant strains grow in a salts medium with or without