The Structure of Neoxanthin

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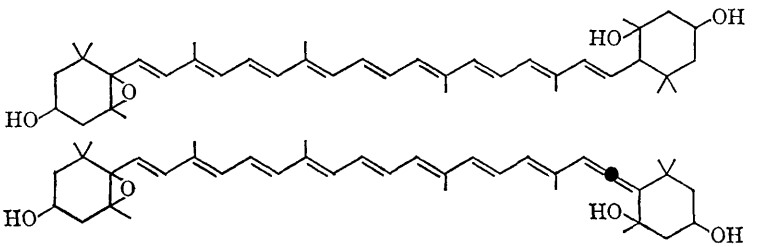
NEOXANTHIN was first described by Strain[1] and is one of the major xanthophylls of photosynthetic tissues.[2] Early work by Curl and Bailey[3] suggested a trihydroxy-5,6-epoxide structure for neoxanthin. Later Goldsmith and Krinsky[4] suggested that neoxanthin is 3,3′,5′(or 6′)-trihydroxy-6 (or 5′)-hydro-5,6-epoxy-β-carotene. More recently Curl[5] suggested that neoxanthin is 5,6-epoxy-5,6,5′,6′-tetrahydro-3,3′,5′(or 6′)-trihydroxy-β-carotene (I). In a recent paper Schimmer and Krinsky[6]



re-examined neoxanthin from *Euglena gracilis*. They also assigned formulation (I) to neoxanthin. This was deduced from visible, spectral, and partition data and from results of acetylation and dehydration studies.

A recent communication by Cholnoky *et al.*[7], assigned structure (II) to foliaxanthin which is also present in photosynthetic tissues.[8] Previous reports[3,4,7,9] have contained suggestions that neoxanthin is identical to foliaxanthin. We have examined neoxanthin from spinach leaves. We report herein spectroscopic and chromatographic data which indicates that neoxanthin has structure (II) and is identical to foliaxanthin: λ_{max}(ethanol) 467, 438, and 416 mμ; λ_{max} (light petroleum) 464·5, 435, and 410 mμ; ν_{max}(KBr) 3400 (OH), 1931 (–C=C=C–), 1450 (–CH_2– in cyclohexane ring), 1150 (t-OH), 1070 (–C=C=C–), and 1040 cm.$^{-1}$ (sec.-OH). Our neoxanthin was compared with an epoxy pigment (assumed to be foliaxanthin) isolated from maple leaves and barley and which showed the same column chromatographic behaviour.

N.m.r. spectrum is consistent with structure (II); a signal at τ 8·17 can be tentatively attributed to the "in-chain" methyl protons adjacent to the allenic linkage as opposed to the normal "in-chain" methyl protons at τ 8·03.

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