Animal Carotenoids. 10*. Chirality of Astaxanthin of Different Biosynthetic Origin

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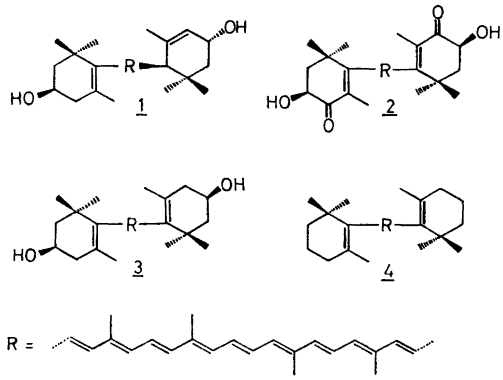
Hitherto no carotenoids of identical constitution have been encountered in Nature with different chirality,[1,2] a phenomenon which may reflect general biosynthetic routes.

Astaxanthin has a wide-spread occurrence. Its biosynthesis in goldfish has been considered to occur from lutein,[3] a result recently questioned on the basis of the absolute configuration of lutein (*1*) [4,5] and astaxanthin (*2*).[6] A precursor role of zeaxanthin (*3*) or β-carotene (*4*) is better compatible with the chirality of astaxanthin. More recently an alternative biosynthetic route from β-carotene (*4*) to astaxanthin (*2*) has been reported for goldfish,[7,8] similar to findings for Crustaceae.[9–12]

Studies by Veerman [13–15] suggest that astaxanthin in spider mites is synthesized from β-carotene (*4*) of plant origin. It was considered of interest to examine the chirality of astaxanthin resulting from mite metabolism.



Astaxanthin diesters (λ_{max} 500 nm in CS_2) were isolated from an unsaponified extract of *Schizonobia sycophanta* Womersley [16] by TLC on plates according to Bjørnland [17] (prepared from 30 g kieselgel, 9 g MgO, 12 g $Ca(OH)_2$, 3 g $CaSO_4$ and 93 ml H_2O) using 30 % acetone in petroleum ether for development. The CD spectrum in EPA (diethyl ether:isopentane: ethanol 5:5:2) solution (Fig. 1) was in the 230 – 340 nm region consistent with that of astaxanthin (*2*) monoester *ex* lobster,[6] demonstrating the 3*S*,3′*S*-chirality also of astaxanthin (*2*) produced by spider mite.

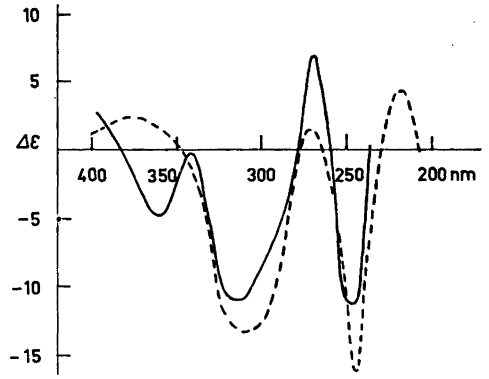


Fig. 1. CD spectra of – astaxanthin diester *ex S. sycophanta* and - - - astaxanthin monoester *ex* lobster in EPA solution. Δε values valid only for ———.

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Received February 27, 1975.

* No. 9. *Acta Chem. Scand. B 28* (1974) 1247.