

TITLE

Structural determination of chlorophyll *f* found in a cyanobacterium strain KCI newly isolated from Lake Biwa by HPLC, absorption, circular dichroism, mass and NMR spectroscopy.

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In 2010, Chen *et al.* discovered a red-shifted chlorophyll in a methanolic extract of Shark Bay stromatolites, and was named Chl *f*. In 2011, Ohkubo *et al.* found Chl *f*-like pigment in a unicellular cyanobacterium newly isolated from Lake Biwa, but the pigment was detected only when it was cultivated under near infrared light. In this work, we have determined the molecular structure of this pigment by HPLC, absorption, CD, mass and NMR measurements. The absorption spectrum of the pigment in methanol was completely different from that of Chl *a*, but similar to the reported spectrum of Chl *f*. The Soret and Q_y bands were red-shifted, compared to Chl *a* and Chl *d*. The Soret band of this pigment was well split in diethyl ether and benzene, while Chl *d* showed such a split not in those solvents but in methanol. The Soret/Q_y-band ratio of this pigment in methanol was ca. 0.9, different from the reported value of ca. 1.9. The pigment was easily separated from Chls *a*, *b* and *d* in our normal-phase HPLC; Chl *f* eluted between Chl *a* and Chl *b* (or *d*). CD spectral analysis showed that the pigment is not prime-type but normal-type. Mass analysis exhibited that molecular formula of this pigment is C₅₂H₇₂O₆N₄Mg, same as that of Chls *b* and *f*. The transformation of a methyl moiety of Chl *a* to a formyl one yielding Chl *f* was revealed by NMR analysis; the pigment has been identified to be 2-formyl-Chl *a*, namely, Chl *f*.

Biography

M. Kobayashi has completed his Ph.D from University of Tokyo. He has published more than 100 papers mainly in the field of chlorophylls.