Seminario interno

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Biosynthesis of long chain aliphatic compounds in *Nannochloropsis* spp. (Eustigmatophyceae).

Abstract
We investigated potential biosynthetic pathways of long chain alkenols (LCAs), long chain alkyl diols (LCDs) and long chain hydroxy fatty acids in *Nannochloropsis oceanica* and *Nannochloropsis gaditana*, by combining culturing experiments with genomic and transcriptomic analyses. Incubation of *Nannochloropsis* spp. in the dark for 1 week led to significant increases in the cellular concentrations of LCAs and LCDs in both species. Consistently, ^{13}C-labeled substrate experiments confirmed that both LCA and LCD were actively produced in the dark from C_{14-18} fatty acids by either condensation or elongation/hydroxylation, although no enzymatic evidence was found for the former pathway. *Nannochloropsis* spp. did, however, contain (i) multiple polyketide synthases (PKSs) including one type(PKS-Clade II) that might catalyze incomplete fatty acid elongations leading to the formation of 3-OH-fatty acids, (ii) 3-hydroxyacyl dehydratases (HADs), which can possibly form monounsaturated fatty acids and (iii) fatty acid elongases (FAEs) that could elongate 3-OH-fatty acids and monounsaturated fatty acids to longer products. The enzymes responsible for reduction of the long chain fatty acids to LCDs and LCAs are, however, unclear. A putative wax ester synthase/acyl coenzyme A (acyl-CoA): diacylglycerol acyltransferase is likely to be involved in the esterification of LCAs and LCDs in the cell wall. Our data thus provide useful insights in predicting the biosynthetic pathways of LCAs and LCDs in phytoplankton suggesting a key role of FAE and PKS enzymes.