Lipidomics of harpacticoid copepods in a changing ocean

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Long-chain polyunsaturated fatty acids (LC-PUFA) like omega-3 are highly concentrated in marine fish and receive a lot of attention in view of their considerable health benefits for humans. In the marine environment, basically all long-chain fatty acids are made *de novo* by microalgae but can be modified by bioconversions as they pass up the food chain. However, this fatty acid supply may be threatened in the future since LC-PUFA production is predicted to be reduced in phytoplankton as a result of climate warming (Hixson et al. 2016).

Since these omega-3 fatty acids are essential for zooplankton growth and consequently for the development of higher trophic levels (fish) feeding on them, knowledge on the assimilation and modification of fatty acids in first-level consumers/grazers like copepods is crucial to anticipate the effects of global change. However, the factors triggering fatty acid bioconversion in marine grazers remain unknown.

Therefore, this PhD research aims (1) to determine the efficiency of transfer of fatty acids from primary producers (diatoms) to consumers (harpacticoid copepods) in a global change scenario and (2) to study the molecular pathways of fatty acid biosynthesis and metabolism by means of transcriptomics.

A transcriptome will be assembled which we will use to identify desaturase/elongase genes in a harpacticoid copepod. Subsequently, mRNA expression of these genes under different experimental conditions of temperature and pH can be analyzed. The results can be used to translate the fatty acid pathways at the individual and species level to the community level by means of food web modeling and should improve our knowledge on potential effects of global change on the production of fatty acids.

Keywords: transcriptomics; fatty acid biosynthesis; global change; omega-3; copepods

Reference

- Hixson, S. M., Arts, M. T. (2016). Climate warming is predicted to reduce omega-3, long-chain, polyunsaturated fatty acid production in phytoplankton. *Global Change Biology*, *22*(8), 2744–2755. https://doi.org/10.1111/gcb.13295