Determining partial 18S rDNA sequences of alkenone-producing prymnesiophyte algae from Greenland lake sediments

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Modern and ancient sediments from a group of oligosaline lakes in Kangerlussuaq, West Greenland, contain extraordinarily high concentrations of long-chain (C_{37}-C_{39}) alkenones. Alkenones are important biomarkers unique to certain prymnesiophyte algae and useful for paleoclimate reconstruction because the degree of unsaturation exhibited by alkenones is directly related to water temperature. While the marine alkenone-producers

are well known, the exact prymnesiophyte species responsible for alkenone production in lakes remain unidentified, preventing the calibration of alkenone unsaturation to temperature for these valuable geological archives. Preserved ribosomal DNA (rDNA) of prymnesiophyte algae was recovered from the water column and Holocene sediments of three oligosaline lakes in West Greenland (BrayaSø, HundeSø, and SS6). Prymnesiophyte community members were determined by comparative sequence analysis. An rDNA-based diversity evaluation of prymnesiophyte algae is used to assess total lake diversity, as well as the presence or absence of prymnesiophyte niches within the lake. This tandem study of lipid and nucleic biomarkers (alkenones and rDNA) facilitates the habitat location and genetic identification of alkenone-producers, as well as assessment of organism diversity and the regional extent to which future, culture-based temperature calibrations may be applied. Preliminary work indicates the presence of rDNA in buried Holocene sediments, presenting the possibility of using a stratigraphical approach to reconstruct planktonic population changes through time.