Aquat. Sci. (2010) 72:443–453
DOI 10.1007/s00027-010-0147-6

Aquatic Sciences

RESEARCH ARTICLE

Variation in transparent exopolymer particles in relation to biological and chemical factors in two contrasting lake districts

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Received: 11 February 2010 / Accepted: 14 May 2010 / Published online: 10 June 2010

Abstract In inland waters, transparent exopolymer particles (TEP) can affect carbon export and sequestration in sediments with consequences for lake C budgets. We measured TEP concentration in 32 lakes from two contrasting lake districts covering wide ranges in biological and chemical characteristics. North temperate lakes, located in a wet region, have low to moderate ionic strength and low to high dissolved organic carbon with corresponding variation in color (light absorbance). Mediterranean lakes located in a semiarid region were characterized by high ionic strength and high concentrations of dissolved organic carbon but low color. TEP concentrations were large relative to the living portion of the particulate organic carbon pool in both Mediterranean (36%) and north temperate (33%) lakes. TEP concentrations ranged from 36 to 1,462 μg [as Gum Xanthan equivalents (GX eq)] L^{-1} in north temperate lakes. In the Mediterranean lakes, concentrations were higher that previously reported for other systems and ranged from 66 to 9,038 μg GX eq L^{-1}. TEP concentration was positive and significantly related to chlorophyll *a* (chl *a*) in north temperate lakes and in the entire data set. Although a significant and positive relationship between TEP and chl *a* was also detected in the Mediterranean lakes, bacterial abundance was most strongly related to TEP. In contrast with the positive influence of phytoplankton and bacteria on TEP, there were weaker relationships between TEP and the chemical variables tested. We observed a significant and positive relationship between pH and TEP (for all lakes) but this relationship was indirectly driven by a co-variation of pH with phytoplankton biomass based on multiple regression analysis. For the Mediterranean lakes, the negative (but not significant) trends between TEP and both conductivity and divalent cations suggest thresholds above which TEP will likely be destabilized. Under these conditions, TEP may flocculate or disperse in the water column.

Keywords Transparent exopolymer particles (TEP) · Inland waters · Dissolved organic matter · Carbohydrates

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