Effect of salinity on cyanobacterial community composition along a transect from Fuliya spring into the water of Lake Kinneret, Israel

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With 3 figures

Abstract: Cyanobacterial community composition was studied along a salinity gradient from the saline Spring Fuliya towards the water column of Lake Kinneret. The samples included a gradient of salinities ranging from 4270 mg Cl L⁻¹ (Saline Spring) to 239 mg Cl L⁻¹ (Lake Kinneret). Denaturing gradient gel electrophoresis (DGGE) and cloning of the 16 S rRNA gene, as well as cloning and sequencing of the psbA gene, were used to characterize cyanobacterial community composition. Despite the differences in salinity, similar cyanobacterial communities were observed in the lake and the saline spring, the only exception being the highest salinity sample (4270 mg Cl L⁻¹). Both, DGGE patterns and results of the clone libraries revealed the dominance of cyanobacteria with colonial Gloeocapsa and unicellular Synechococcus as the closest known cultured relatives, independently of the salinity. These results suggest that cyanobacterial populations inhabiting this freshwater lake and its saline sources can adapt to a wide range of salinities.

Key words: 16 S rRNA, psbA, cyanobacteria, Fuliya, Lake Kinneret.

Introduction

Lake Kinneret is a monomictic subtropical freshwater lake located in the northern part of Israel. Besides its importance as a freshwater resource for Israel, Lake Kinneret is a unique case of limnological and geochemical evolution. It originated from an inland water body with high salinity formed by a seawater arm that covered the subsiding rift valley during the Miocene (Hazan et al. 2005). As is typical of rift lakes, fast and large hydrological fluctuations in Lake Kinneret were accompanied by drastic variations of water salinity, involving a rapid transition from saline to freshwater (Hurwitz et al. 2000). At present, Lake Kinneret still possesses a relatively high salinity (~250 mg Cl⁻¹ L⁻¹), resulting from different saline springs (Rimmer & Gal 2003) that contribute less than 10 % of the lake-water, but provide almost 90 % of its salts (Klein-Bendavid et al. 2005).

Cyanobacteria are an essential component of phytoplankton communities in different aquatic environ-