Spatio-temporal Variability of Microbial Eukaryotic Community Composition in a Large Shallow Subtropical Lake, Assessed by 18S rRNA Gene Sequences

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Summary. We investigated the spatial and temporal variability of the microbial eukaryote community composition (MECC) in Lake Taihu using 18S rRNA gene clone libraries. Samples were collected during different seasons (February, May and August in 2007) from two distinct ecological sites. A total of 695 clones from six libraries were clustered into 162 operational taxonomic unit (OTU), most of which were affiliated with cryptophyta, stramenopile, alveolata, fungi, cercozoa or chlorophyta. Overall, 74% of OTUs were < 98% similar to any sequences in GenBank, and 56% of these were < 95% similar to previously recovered sequences, which is indicative of undersampled taxa in freshwater ecosystems. Both sites included many unique OTUs and the MECC diversities were higher at East Bay than at Meiliang Bay. Nearly 90% of OTUs were only detected in one of three seasons, suggesting a temporal variation of MECC. Canonical correspondence analysis suggested that concentrations of total phosphorus and total dissolved nitrogen and the densities of cladocera and rotifera were the most important factors in explaining the spatio-temporal variations of MECC.

Key words: Microbial eukaryote, 18S rRNA, spatio-temporal variability, Lake Taihu.

INTRODUCTION

Many studies have shown that microbial eukaryotes constitute an essential component of microbial food webs and play a crucial role in aquatic environments (Azam et al. 1983, Caron et al. 1999, Jürgens et al. 1999). However, numerous members of this community lack sufficient taxonomic characteristics to facilitate their identification using traditional methods (Gast et al. 2004). Molecular methods offer a very useful alternative for the study of small eukaryotes and have widened our knowledge of the structure of microbial eukaryotes in aquatic environments (López-García et al. 2001, Diez et al. 2001, Berney et al. 2004, Lefranc et al. 2005, Richards et al. 2005, Šlapeta et al. 2005).

Lake Taihu is a large shallow subtropical lake in China harboring two distinct ecological habitats (i.e., phytoplankton- and macrophyte-dominated habitats).