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VERTICAL BACTERIOPLANKTON STRUCTURE
IN TWO STRATIFIED TEMPERATE LAKES OF EUROPEAN RUSSIA

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Persistent lake stratification is often accompanied by anoxia in the bottom layer, leading to pronounced vertical heterogeneity of microbial communities and their functional potential. We investigated the vertical distribution of bacterioplankton in two clear-water stratified lakes: Lake Palenoe (Southern boundary of the forest zone, 27 ha, 8 m deep) and Lake Prudovikov (forest-steppe zone, 6.5 ha, 5.5 m deep). Among the heterotrophic bacterioplankton, Planctomycetota and Verrucomicrobiota dominated in both lakes by relative read abundance, with Proteobacteria and Bacteroidota occupying the third and fourth positions. Common freshwater Actinomycetota and Pseudomonadota, e.g., *Nanopelagicus* and *Planktophilia* (Nanopelagicales), *Fonsibacter* (Alphaproteobacteria), and Comamonadaceae (Betaproteobacteria), were present in both lakes at similar but low abundances. At lower taxonomic levels, the bacterioplankton of the two lakes differed substantially. Furthermore, while in the epilimnion the amplicon sequence variants (ASVs) present in one lake were substituted by different, but closely related sequences in the other, the differences between the samples from the anaerobic layers were more pronounced due to a more phylogenetically contrasting ASV structure. In general, the vertical structure of bacterioplankton in Lake Prudovikov was notably less diverse than that in Lake Palenoe. Cyanobacteria was the dominant phylum in the epilimnion of Lake Prudovikov but ranked fourth in the less productive Lake Palenoe. In both lakes, representatives of Cyanobiaceae were among the dominants. Besides, the cyanobacteria *Dolichospermum* spp. and *Planktothrix isothrix* were dominant in Lake Palenoe, while *Pseudanabaena*, *Raphidiopsis*, and *Planktothrix agardhii* prevailed in Lake Prudovikov. Different taxa of Cyanobacteria and Chlorobiota dominated among phototrophic bacteria in the chemocline of both lakes and the hypolimnion of Lake Palenoe; other groups were minor. Within Chromatiaceae, *Thiodictyon syntrophicum* was found in Lake Palenoe, whereas three ASVs belonging to *Chromatium okenii* (previously not recorded in this lake) and an undetermined ASV distantly related to both *Thiodictyon* and *Lamprocystis* were present in Lake Prudovikov. Despite clear differences in phylogenetic structure, analysis of PICRUSt2-predicted metabolic pathway abundances revealed functional similarities between the epilimnetic bacterial communities of both lakes. However, samples from the chemocline zone (3.5–4.0 m) and the lowest studied horizon of Lake Palenoe (6 m) differed most markedly from other samples and from each other. Our data demonstrate that functional structure remains considerably stable at high steps of the pathway hierarchy and rather contrasting at the level of predicted gene orthology structure.

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