Characterization of chemosynthetic microbial communities in warm, white covered sediments at the Logatchev hydrothermal vent field

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Microbial mats have been described for different hydrothermal vent sites, e.g. along the East Pacific Rise (Taylor et al., 1999), in the Western Pacific (Takai et al., 2003), and at the Loihi Seamount (Moyer et al., 1995). In our study, we investigated the microbial community of two different sediments covered with white mats at the Logatchev hydrothermal vent area on the Mid-Atlantic Ridge (14°45`N). The white areas were occasionally interspersed with mussels at diffuse venting sites. Temperature measurements showed 2-3 °C in the surface layer of both sediments increasing to up to 99°C in 28 cm depth. The corresponding temperature profiles revealed a linear temperature gradient indicating a high conductive heat flux and no fluid flow. In contrast, the temperature of the sediments outside of the white-covered areas increased from 2-3°C to a maximum of only 8°C in 28 cm depth. To investigate the microbial diversity within the sediment surface layer (0-1 cm) of the white-covered areas 16S rRNA clone libraries were constructed. The analysis of about 100 clones per site resulted in 10-13 detected phyla. Using operational taxonomic units (OTUs), members of the *Gamma-*, *Delta-*, and *Epsilonproteobacteria* as well as of the phylum *Bacteroidetes* were identified as mat specific. CARD-FISH experiments confirmed that members of these four phylogenetic groups constitute the majority of microorganism in the surface sediment layer of the “white mat” community. Typical filamentous sulphur-oxidizing bacteria of the genera *Beggiatoa* and *Thiothrix* were not detected.

In conclusion, the microbial community of the white mats was found to be highly diverse. However, mat specific groups were identified, which phylogeneticaly affiliated mainly with cultured sulphur-oxidizing bacteria. The high temperature in the deeper sediment layers correlates with the appearance of the white mats on the sediments. This suggests that a high subsurface temperature could cause processes supporting the formation of white mats on hydrothermal sediments.

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