

Unique bacterial phylotypes in a meltwater pond in Inhovde, East Antarctica

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Antarctic freshwater ecosystems are usually dominated by microorganisms. Among these, algae and bacteria often form a mat consortium at the bottom of the water body. Such consortia provide a habitat for phylogenetically diverse microorganisms (Paerl *et al.*, 2000). In this study, we examined a unique mat consortium in a meltwater pond in Antarctica. During the 56th Japanese Antarctic Research Expedition (JARE-56), pond water and dark-brown-colored mat samples were collected from ponds in Inhovde, East Antarctica, for microbial diversity analysis (Figure 1a). The concentration of nutrients such as nitrate, nitrite, ammonium, and phosphate in the pond water was below detection limits. Microscopic observation showed that brown filamentous structures dominated the mat specimens (Figure 1b). The diversity of 16S rDNA genotypes, or phylotypes, in the pond water was low, with members of the phyla *Armatimonadetes* (former candidate division OP10; Tamaki *et al.*, 2011), *Bacteroidetes*, and *Proteobacteria* dominant. On the other hand, 16S rDNA diversity in the mat was high with members of the phyla *Armatimonadetes*, *Bacteroidetes*, *Chloroflexi*, *Planctomycetes*, *Proteobacteria*, and *Verrucomicrobia*. Several phylotypes detected in these six phyla were novel taxa at the species, genus, or class level and were related to micro-aerobic and anaerobic bacteria. Unexpectedly, cyanobacterial phylotypes were scarce in the studied mat specimen. The high genetic diversity of bacterial communities may be affected by the micro-scale aerobic/anaerobic redox gradient within the mat.

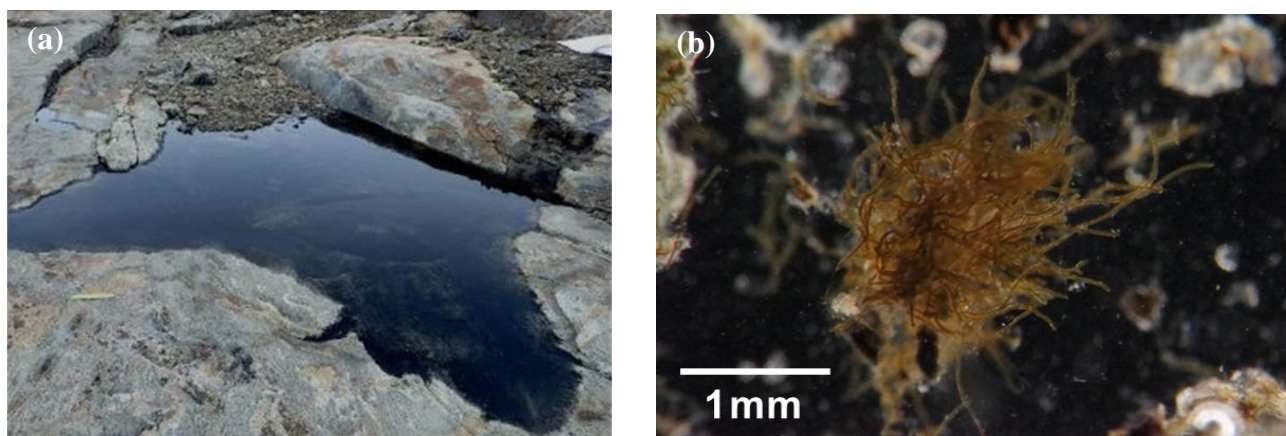


Figure 1. A meltwater pond harboring dark-brown-colored mat (a) and filamentous structures in the collected mat samples (b)

References

1. Paerl HW, Pinckney JL, Steppe TF (2000) Cyanobacterial-bacterial mat consortia: examining the functional unit of microbial survival and growth in extreme environments. *Environ Microbiol*, **2**: 11-26.
2. Tamaki H, Tanaka Y, Matsuzawa H, Muramatsu M, Meng XY, *et al.* (2011) *Armatimonas rosea* gen. nov., sp. nov., of a novel bacterial phylum, *Armatimonadetes* phyl. nov., formally called the candidate phylum OP10. *Int J Syst Evol Microbiol*, **61**: 1442-1447.