Project for master thesis in the group Aquatic Microbiology:

Characterization and description of a pure culture of groundwater cable bacteria

Cable bacteria are exceptional organisms that can oxidize sulphide at one end of a long bacterial filament and reduce oxygen at the other end (1). We found such cable bacteria at fringes of contaminant plumes in aquifers and recently elucidated that the energy conservation is most likely performed by sulphur disproportionation (2,3). The organism can also interact with higher organisms such as aquatic plants, where they grow in association with the root hairs and utilize the oxygen released by the root to oxidize sulphide in the sediment (4,5).

We now isolated the first pure culture of cable bacteria and want to describe the organism. The work will include the sequencing and analysis of the genome. We will test the metabolic potential, describe physiological properties, and perform analyses that are needed for the taxonomic classification of the organism. Finally, we will name the bacterium and deposit it in two culture collections, which is a prerequisite for publication.

The applied methods will include bioinformatics, diverse cultivations and analysis with flow cytometry, chemical analysis of metabolism, microscopy and electron microscopy.

Interested students should contact Prof. Rainer Meckenstock or Dr. Verena Brauer.

References:

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2) Muller, H.; Bosch, J.; Griebler, C.; Damgaard, L. R.; Nielsen, L. P.; Lueders, T.; Meckenstock, R. U., Long-distance electron transfer by cable bacteria in aquifer sediments. *Isme J* **2016,** *10*, (8), 2010-2019.
3) Scholz, V. V.; Müller, H.; Koren, K.; Nielsen, L. P.; Meckenstock, R. U., The rhizosphere of aquatic plants is a habitat for cable bacteria. *FEMS Microbiol. Ecol.* **2019,** *96*, fiz062.
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5) Scholz, V. V.; Meckenstock, R. U.; Nielsen, L. P.; Risgaard-Petersen, N., Cable bacteria reduce methane emissions from rice-vegetated soils. *Nature Communications* **2020,** *11*, (1), 1878.