Interrelation and competition of different types of iron-oxidizing microorganisms in marine coastal sediments

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Iron is an abundant redox-active element in many sediments and iron(III)-reducing and iron(II)-oxidizing bacteria are very important for the redox cycling of iron. There are three known metabolic types of bacteria which can perform iron oxidation at neutral pH, i.e. microaerophilic, nitrate-reducing and phototrophic Fe(II)-oxidizers. Based on geochemical conditions in marine sediments, all three can potentially co-exist with possibly overlapping niches [1]. Consequently there is potential for competition for their electron donor, i.e. Fe(II). However, most studies in marine environments so far have focused on microaerophilic Fe(II)-oxidizers and it has not been investigated whether all three metabolic types of iron-oxidizing bacteria co-exist within one sedimentary habitat and how they interrelate and compete with each other.

In our study, we determined the distribution of the different metabolic types of iron-oxidizing bacteria along the redox gradients within a coastal marine sediment from Aarhus Bay, Denmark, by MPN studies and qPCR. The iron oxidizing activity of the different metabolic types and their potential contribution to iron mineral formation within the sediment was quantified by microcosm studies. Ultimately, we are investigating the interrelation, competition and thus the ecological network of iron-oxidizing bacteria in order to get an understanding of the importance of the different types of iron-oxidizers in coastal marine sediments.

[1] Schmidt *et al* (2010) *Environ. Chem.* **7**, 399-405.