CHEMOLITHOTROPHIC DENITRIFICATION IN NITRATE-INDUCED ANOXIC MARINE SEDIMENT REMEDIATION AND ISOLATION OF AST-10 A NOVEL *THIOMICROSPIRA DENITRIFICANS*-LIKE BACTERIAL STRAIN

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Background: During nitrate-induced sediment remediation, chemolithotrophic bacterial coupling sulfide oxidation and nitrate reduction dominated the microbial community.

Objectives:

1. Characterization of the chemolithotrophic denitrification process during sediment remediation.
2. Isolation and characterization of AST-10 a novel *Thiomicrospira denitrificans*-like bacterial strain.

Methods:

Microbial community: 16S rDNA based approaches;

Morphology: SEM & TEM.

Results:

1. By adding nitrate to anoxic sulfide-rich marine sediment, the activities of chemolithotrophic denitrifiers were stimulated to oxidize sulfide to sulfate and reduce nitrate to dinitrogen and nitrous oxide. The chemolithotrophic denitrification accounted for over 70% of total nitrate reduction.
2. Through DGGE analysis, two major species responsible for chemolithotrophic denitrification were identified. One was phylogenetically related with *Thiomicrospira paralvinellae* and *Thiomicrospira denitrificans*, and the other closely related to *Thiohalophilus thiocyanoxidans*. Using a primer set designed specifically for *Tm. denitrificans*, six new *Tm. denitrificans*-like OTUs were identified by cloning-sequencing. They had >97% similarity with *Tm. denitrificans* and its relatives.
3. AST-10 a novel *Thiomicrospira denitrificans*-like bacterial strain was isolated from nitrate treated sediment and deposited in DSMZ as DSM 22096. AST-10 can utilize hydrogen gas, thiosulfate and sulfide as its electron donor under anaerobic conditions. The morphology of this strain was determined by electron microscopy.

Conclusions:

1. The chemolithotrophic denitrification, was found to be the major denitrification process in this study. *Thiomicrospira denitrificans*-like species dominated the whole microbial community.
2. AST-10 a novel *Thiomicrospira denitrificans*-like bacterial strain capable of using hydrogen gas, thiosulfate and sulfide as its electron donor was isolated and characterized.