Co-existence of Anaerobic Ammonium Oxidation Bacteria and Denitrifying Anaerobic Methane Oxidation Bacteria in Sewage Sludge: Community Diversity and Seasonal Dynamics - DTU Orbit (09/11/2017)

Co-existence of Anaerobic Ammonium Oxidation Bacteria and Denitrifying Anaerobic Methane Oxidation Bacteria in Sewage Sludge: Community Diversity and Seasonal Dynamics

Anaerobic ammonium oxidation (ANAMMOX) and denitrifying anaerobic methane oxidation (DAMO) have been recently discovered as relevant processes in the carbon and nitrogen cycles of wastewater treatment plants. In this study, the seasonal dynamics of ANAMMOX and DAMO bacterial community structures and their abundance in sewage sludge collected from wastewater treatment plants were analysed. Results indicated that ANAMMOX and DAMO bacteria co-existed in sewage sludge in different seasons and their abundance was positively correlated ($P < 0.05$). The high abundance of ANAMMOX and DAMO bacteria in autumn and winter indicated that these seasons were the preferred time to favour the growth of ANAMMOX and DAMO bacteria. The community structure of ANNAMOX and DAMO bacteria could also shift with seasonal changes. The “Candidatus Brocadia” genus of ANAMMOX bacteria was mainly recovered in spring and summer, and an unknown cluster was primarily detected in autumn and winter. Similar patterns of seasonal variation in the community structure of DAMO bacteria were also observed. Group B was the dominant in spring and summer, whereas in autumn and winter, group A and group B presented almost the same proportion. The redundancy analysis revealed that pH and nitrate were the most significant factors affecting community structures of these two groups ($P < 0.01$). This study reported the diversity of ANAMMOX and DAMO in wastewater treatment plants that may be the basis for new nitrogen removal technologies.

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