Recently discovered bacterium holds promise for improved wastewater treatment

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The recent discovery of the comammox bacterium might prove pivotal in a new and improved approach to wastewater purification that will be more efficient according to research carried out by Pieter Blom. Mr.

Blom will receive his Ph.D. on the subject from Radboud University on 4 April.

Water treatment facilities remove nitrogen, among other substances, from wastewater before releasing it back into the environment. "The current process is far from ideal," explains microbiologist Pieter Blom. "Specific bacteria convert nitrogen into nitrate, but these bacteria require a lot of oxygen, which in turn requires a great deal of energy. Other bacteria species then convert the nitrate back into harmless nitrogen gas, which constitutes 80% of the air we breathe. This process also requires a substantial quantity of carbon."

Anammox

Clearly, this process is inefficient. However, the anammox bacterium was discovered 20 years ago, and is a bacterium that can convert nitrogen directly into nitrogen gas without oxygen. Although this appears to be the perfect solution on paper, these bacteria are exacting. "Anammox bacteria do not require oxygen or carbon; However, they do need the correct nitrogen-nitrite ratio. And it's here that the comammox bacteria may offer assistance."

Blom discovered that the comammox bacterium has the ability to convert nitrite to nitrate, and vice versa. This means it has the ability to ensure the right ratio for the anammox bacterium, which, in turn, means the anammox bacterium can carry out its job properly.

"It appears that comammox is the perfect partner for anammox in terms of wastewater treatment," the researcher explains. The crucial element was that the conditions suitable for the anammox process also favored comammox, and this did prove to be the case. "We observed in any case that comammox also grows well in low-oxygen environments and is able to function well in these conditions. This means that combining it with

anammox is indeed a possibility."

Conditions

The comammox bacterium appears to close the loop for efficiently and effectively removing nitrogen from wastewater using the anammox bacterium. "Undoubtedly, more research is needed, but the comammox bacterium does what we hoped and expected it would do. It has the potential to create favorable conditions for anammox."

Provided by Radboud University

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