

Pee power: Urine-loving bug churns out space fuel

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Scientists on Sunday said they had gained insights into a remarkable bacterium that lives without oxygen and transforms ammonium, the ingredient of urine, into hydrazine, a rocket fuel.

So-called anammox -- for anaerobic [ammonium](#) oxidation -- germs caused a sensation when they were first identified in the 1990s, but uncovering their secrets is taking time.

In a letter published by the British science journal *Nature*, researchers at Radboud University Nijmegen in the Netherlands reported they had identified the [molecular mechanism](#) by which the bugs do their fuel-trick.

"Proving this was quite a feat," said Mike Jetten, professor of microbiology at the university's Institute for Water and Wetland Research.

"We had to deploy a range of new experimental methods. In the end, we managed to isolate the protein complex responsible for hydrazine production, a beautifully red mixture."

The team's work initially piqued NASA's interest, but this faded when the US space agency learned that only small quantities of precious hydrazine are produced, "nothing like enough to get a rocket to Mars," said Jetten.

"Now we are accurately determining the [crystal structure](#) of the protein complex. Perhaps we can improve the production process if we have a better understanding of how the protein complex fits together."

Anammox is now used commercially in water purification because it is so energy-efficient in breaking down ammonia.

It also has potential applications as a biofuel, cleaning up sewerage sludge without the need for pumps to provide air, and providing methane in return.

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