

No laughing matter -- bacteria are releasing a serious greenhouse gas

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Unlike carbon dioxide and methane, laughing gas has been largely ignored by world leaders as a worrying greenhouse gas. But nitrous oxide must be taken more seriously, says Professor David Richardson from the University of East Anglia in Norwich, UK, speaking today at the Society for General Microbiology's 162nd meeting being held this week at the Edinburgh International Conference Centre.

“It only makes up 9% of total greenhouse gas emissions, but it's got 300 times more global warming potential than carbon dioxide”, says Prof Richardson. “It can survive in the atmosphere for 150 years, and it's recognised in the Kyoto protocol as one of the key gases we need to limit”.

The potent gas is mainly coming from waste treatment plants and agriculture. Its release is increasing at the rate of 50 parts per billion or 0.25% every year. This means that it can be better controlled with suitable management strategies, but only if the importance of nitrous oxide (N_2O) is widely recognised first.

“When faced with a shortage of oxygen, many species of bacteria can switch from using oxygen to using nitrates instead”, says Prof Richardson. “Nitrates can support their respiration, the equivalent of our breathing, and bacteria can get energy through processes called denitrification and ammonification. When they do this nitrous oxide is released into the environment”.

Municipal sewage treatment plants, landfill sites and marshy areas polluted with too much agricultural fertiliser are all places teeming with so many bacteria that there is a shortage of oxygen for all of them to survive using normal respiration alone. This means they need to use other respiratory strategies, which release nitrous oxide.

The researchers are using a combination of laboratory based studies, fieldwork and computer modelling to understand better the key environmental variables that make different micro-organisms release nitrous oxide.

“We are finding new biological routes for nitrous oxide emission that no-one ever suspected before. This could make a big impact on our environment”, says Prof Richardson. “Global warming affects everyone, and understanding the biology of nitrous oxide emissions will be an important step in mitigating their impact. We urgently need to start developing better strategies to improve management of these emissions in the agricultural and waste treatment sectors”.

Source: Society for General Microbiology

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