Climate changing gas from some surprising microbial liaisons

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The climate changing gas dimethyl sulphide (DMS) is being made by microbes at the rate of more than 200 million tonnes a year in the world's seas, scientists heard today at the Society for General Microbiology's 162nd meeting being held this week at the Edinburgh International Conference Centre.

"This gas has many different effects", says Dr Andrew Curson from the University of East Anglia in Norwich, UK. "It triggers clouds to form over the oceans – and clouds are amongst the worlds most potent climate cooling factors; it attracts birds by alerting them to a food supply; and it smells – that typical seaside smell."

The source of the dimethyl sulphide gas is another sulphur compound made by many seaweeds and marine plankton as an anti-stress protection. Some marine bacteria can break down this compound to release chemical energy, and dimethyl sulphide is given off as a by-product, with about 10% finding its way up into the atmosphere.

"Using genetic analysis, we showed for the first time that different types of bacteria could degrade the sulphurous compound made by phytoplankton in different ways. We even found some species of bacteria that could use multiple methods to break down and release dimethyl sulphide," says Dr Curson.

The research identified the genes needed to make DMS, and the scientists had three surprises. The first was that different bacteria use

completely different biochemical mechanisms to break down compounds from phytoplankton. Secondly, the mechanisms that scientists predicted bacteria would use were generally not the ones observed during the investigation. Finally, the scientists were surprised when they identified some “terrestrial” microbes that had never even been suspected of making dimethyl sulphide gas, which have significant ecological and evolutionary consequences.

“These multiple-use genes, which we were particularly interested in, are rampantly transferred between microbes that are very distantly related. By comparing the gene sequences to some massive databases, we could predict which other microbes could also make dimethyl sulphide, even though no-one had previously suspected that they had this ability,” says Dr Curson. “This has given us new insights into the who, the how, and the where in the world microbes are producing a gas that affects our planet in so many ways”.

“We have really only just begun to interpret our findings, and to work out how significant this is. For instance, we have very recently found dimethyl sulphide producing bacteria in the guts of herrings – what does that mean?” says Dr Curson. “We don’t yet even know the entire biochemical pathway for any of the three systems we have discovered. If we want to understand climate change better, we have lots to do.”

Source: Society for General Microbiology