

Anammox: source of BHT stereoisomer in marine sediments

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The stereoisomer of bacteriohopanetetrol (BHT isomer) has been associated previously with anoxic marine environments [1]. However, the biological source of BHT isomer remained unknown. Here, we found that BHT isomer distribution in sediment cores and a surface sediment transect in an anoxic marine enclosure (Golfo Dulce, Costa Rica) correlated strongly with the distribution of ladderane fatty acids (Fig. 1), unique biomarkers for anaerobic ammonium oxidising (anammox) bacteria [2]. Anammox, an important process in the marine nitrogen cycle and active in Golfo Dulce [3,4], is performed exclusively by anammox bacteria.

Our results indicate that the same bacteria are responsible for BHT isomer and ladderanes in Golfo Dulce. This was confirmed by the investigation of the bacteriohopanpolyol (BHP) lipid compositions of two marine anammox cultures, which were found to synthesise BHT and BHT isomer. BHT isomer was the most abundant BHP in these cultures. These results show that marine anammox bacteria may be responsible for at least part of environmentally-observed marine BHT isomer occurrences. Given the substantially greater residence time in geological sediments, BHT isomer is a potentially better suited biomarker than ladderanes for past anammox activity, which have eluded detection in sediments older than 140 kyr.

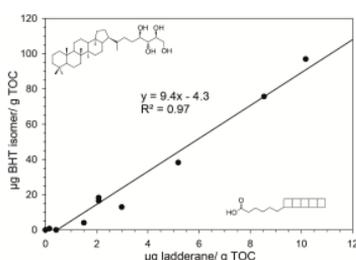


Figure 2: Scatter plot of ladderane fatty acid concentrations versus BHT isomer concentration in Golfo Dulce surface sediments.

- [1] Sáenz *et al* 2011. *Organic Geochemistry* **42**, 1351-1362.
[2] Sinninghe Damsté, *et al* 2002. *Nature* **419**, 708-712. [3] Ward, B.B., 2013. *Science* **341**, 352-353. [4] Dalsgaard, *et al* 2003. *Nature* **422**, 606-608.