

The occurrence of novel ring containing archaeal tetraethers in a stratified lake (Green Lake, NY)

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Planktonic archaea are widespread in both marine and terrestrial aquatic environments. The distribution of archaeal tetraether lipids in stratified water bodies such as the Black Sea [1] and Cariaco Basin [2] is thought to reflect the changes of archaeal groups with water chemistry and depth. We studied the composition of planktonic archaea in a permanently stratified lake, the Green Lake, New York.

Lipid profiles indicate that archaea below the chemocline at 20m produce two novel ring containing GDGTs (glycerol dialkyl glycerol tetraethers). Compared to the regular cyclopentane ring-containing tetraethers, the earlier eluting compounds were reported as abundant in soils near a hot spring [3] and recognized as constitutional isomers of GDGT-1 and -2. Their distinct chromatographic behavior under normal phase and reverse phase liquid chromatograph suggests a unique ring configuration on the biphytane.

Correlative analysis of the archeal diversity in the water samples by high-throughput Illumina sequencing is currently under way to identify biological sources of the novel GDGTs. The distribution of these compounds in Green Lake and other environments suggests that they may be biomarkers of anaerobic archaea favoring sulfidic conditions.

HPLC-APCI-MS

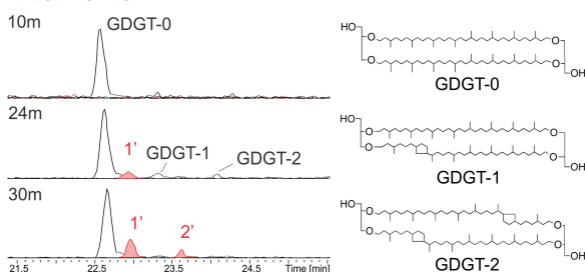


Figure 1: Archaeal tetraether composition at different depths showing the occurrence of novel mono- and di-cyclic GDGTs in anoxic lake waters.

[1] Wakeham (2003) *Geochim. Cosmochim. Acta* **67**, 1359–1374. [2] Liu (2014) *Mar. Chem.* **166**, 1-8. [3] Pitcher (2009) *Appl. Environ. Microbiol.* **75**, 4443-4451.