

BACTERIOHOPANEPOLYOLS DETECTED IN HOT-SPRINGS FROM THE TAUPO VOLCANIC ZONE, NORTH ISLAND, NEW ZEALAND

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The occurrence of bacteriohopanepolyols (BHPs) including a number of novel complex, polyfunctionalised and composite structures in siliceous deposits from hot-spring sites from the Taupo Volcanic Zone, North Island, New Zealand is reported for the first time.

BHPs are known to be bacterial membrane stabilisers (e.g. Kannenburg and Poralla, 1999). Their distribution throughout the geological record, in crude oils, sediments and soils means they are widely regarded as the most abundant biomarker molecule in the geosphere (Orrison and Albrecht, 1992). Previously, BHPs have only been detected in small amounts from hydrothermal environments (Talbot et al. 2005). Samples from 3 sites; Champagne Pool, Opaheke Pool and Loop Road springs, have been analysed, each displaying excellent preservation of organic matter and an impressive array of known and novel BHP structures.

Analyses of BHP composition of siliceous sinters from the Champagne Pool hot-spring show a high degree of structural variety. Composite polyfunctionalised BHPs including bacteriohopanetetrol cyclitol ether (**a**; Fig. 1) and bacteriohopanepentol cyclitol ether (**b**) are the most abundant BHP-structure found at this site. 32, 35-anhydrobacteriohopanetetrol (**c**), widespread in recent and ancient environments (Bednarczyk et al. 2005) together with its penta-functionalised counterpart (**d**; Talbot et al. 2005), have been found in all samples analysed. A series of novel compounds that are still under investigation produce this structure as a fragment during analysis but also contain an additional as yet undetermined functionality at C-35. Thus indicating these unusual BHPs could be the diagenetic product of a larger biological precursor.

Siliceous sinters from Opaheke Pool and silicified rhizoliths from the Loop Road hot-springs contain a number of C-2 and C-3 methylated BHPs. BHPs methylated at C-2 are most abundant in cyanobacteria (Summons et al. 1999) whilst BHPs methylated at C-3 are indicative of methanotrophic bacteria and some acetic acid bacteria (Zundel and Rohmer, 1985). Type I methanotrophs are known to produce large amounts of hexa-functionalised and C-3 methylated, hexa-functionalised BHPs (**e** and **f**; Talbot et al. 2003). Type II

methanotrophs are characterised by abundances of tetra and penta functionalised BHPs (**g** and **h**). BHPs abundant in Type II methanotrophs are found in the Loop Road samples, whereas Opaheke Pool samples contain BHP-signatures from Type I and Type II methanotrophs and also BHP signatures from cyanobacteria (**i** and **j**).

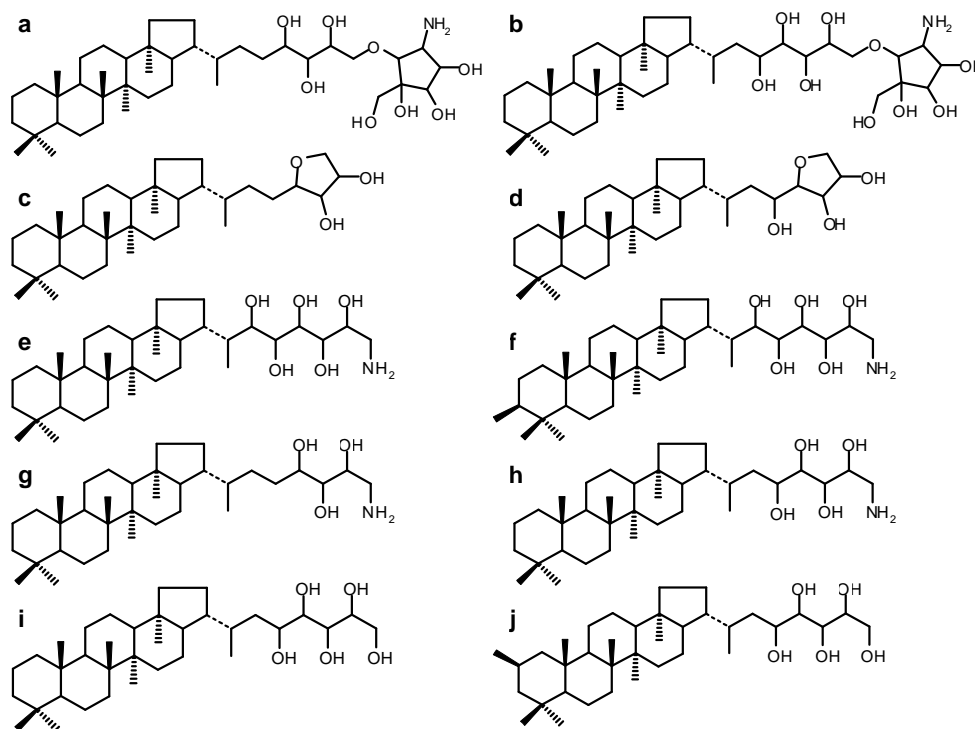


Figure 1. Structures referred to in the text

Future investigations will study the composition of degraded-BHPs (geohopanoids) in these settings and also BHP distribution in other hydrothermal environments, e.g. Iceland.

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