

## An application of Calditoglycerocaldarchaeol to a new geothermometer

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The order Sulfolobales belongs to the domain Archaea, and it distributes over hot springs all over the world. The ether lipids containing calditol residue are specific compounds for this order. Archaea belong to this order are thermoacidophilic with optimum growth temperature at 65 - 90 deg, and optimum pH at 2-3.

Isoprenoids derived from archaeal ether lipids can have up to four cyclopentane rings. In the case of thermoacidophiles, the number of cyclopentane rings increases with increasing their growth temperature (DeRosa et al. 1980). However, the composition of lipids varies depending on species.

Using the data of *Sulfolobus acidocaldarius* given by DeRosa et al. (1980), growth temperature was plotted as a function of average cyclization. The plot was found to be linear;  $y=24x+29$  (y: growth temperature, x: average cyclization of total lipids).

In this study, based on this relationship, the palaeo-temperatures of three hot springs located in the Kirishima area (Yunono-Jigoku, Yahata-Jigoku and Gin'yu) were estimated. For restriction of the producer of ether lipids, average cyclization of the CA fraction (which consists of glucopyranosylcalditoglycerocaldarchaeol and calditoglycerocaldarchaeol) was used for calculation as well as average cyclization of total lipids.

The estimated temperatures, using average cyclization of the CA fraction for calculation, are much higher than those using average cyclization of total lipids. This suggests that the relationship between growth temperature and average cyclization of the CA fraction must be required for calculation, when average cyclization of the CA fraction is used. The estimated temperature of Gin'yu is higher than that of the present hot water even though the average cyclization of total lipids was used for calculation, indicating that the temperature of this hot spring in the past was much higher than that at the present time, in accordance with the geological literature.