

Nitrogen isotopic composition of chlorophylls and porphyrins in geological samples as tools for reconstructing paleoenvironment

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Nitrogen-containing alkyl porphyrins, tetrapyrrole structure of chlorophylls are long preserved in the sediments and sedimentary rock. The nitrogen isotopic signature of these molecules is potentially useful for reconstructing nitrogen cycle in the surface ocean in the geological past. In fact, it has been demonstrated that the nitrogen isotopic composition of chloropigments are tightly linked to those of photoautotrophic cell [1]. However, few studies have reported the nitrogen isotopic composition of these alkyl porphyrins due to the analytical difficulty concerning purification of large amount of geoporphyrins which is required for the precise determination of isotopic composition [2]. Recently, we have overcome some analytical problems and succeeded to determine nitrogen isotopic composition of various sedimentary porphyrins by using both EA/IRMS and GC/C/IRMS. Analytical results of Cretaceous and Miocene black shales deposited in western Tethys and proto-Japan Sea, respectively, strongly suggested that the source photoautotrophs assimilate nitrogen through N₂-fixation pathway [3]. In the presentation, we will discuss the results as well as overview the nitrogen isotopic relationship between cell, chlorophylls, and porphyrins.

References

- [1] Chikaraishi et al. (2005) *Phytochemistry* **66**, 911-920.
- [2] Chicarelli et al. (1993) *GCA* **57**, 1307-1311.
- [3] Ohkouchi et al. (2006) *Biogeosciences*, in press.