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Identification and geochemical significance of a series of rare lanostanes in the alkaline lacustrine source rock from the Mahu Sag, Junggar Basin NW China

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The organic-rich source rocks of high maturity from Lower Permian Fengcheng Formation (P_1f) were deposited under an alkaline lacustrine environment in the Mahu Sag, Junggar Basin, Northwest China[1]. Eight P_1f source rock samples were subjected to solvent extraction and saturated hydrocarbon fractions were collected by column chromatography. The fractions were analyzed by gas chromatography-mass spectrometry: *n*-alkanes, triterpenoid hydrocarbons and steranes were detected. A series of rare lanostanes, including a C_{23} homologue not reported in the previous literature were present in this basin. The absolute concentration of short chain lanostanes bears a strongly positive correlation to those of long chain lanostanes, indicating their possible common biological origin and genesis. A well-defined relationship is evident between the content of lanostanes and the distributions of methyl hepadecanes, 2-methyl hopanes: data points with high 7-+8-methyl hepadecanes/C_{max} and 2-methyl hopanes/C_{30}-hopanes exhibit high lanostane contents. The 7-+8-methyl hepadecanes and 2-methyl hopanes are considered to be special molecule biomarkers sourced from cyanobacteria. Therefore, it is concluded that cyanobacteria also may be the diagnostic biological precursors of lanostanes in P_1f source rock. In addition, the occurrence of rerlatively abundant lanostane may indicate the strongly reducing sedimentary environment, which is characterized by high content of phytane, β-carotanes and gammacerane[2]. The relative invariance of the content of lanostanes with maturity suggest that these compounds are not maturity dependent. Preliminary genesis analysis shows that the long chain (C_{30}-C_{32}) lanostanes in sediments was formed through diagenetic reactions from biological lanosterol via a reduction pathway and then were transformed to short chain lanostanes via demethylation.

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[2] Chen, Philp, Fu, & Sheng (1989), *Geochimica et Cosmochimica Acta 53*, 2775-2779.