The occurrence of extended tricyclic terpanes in the Proterozoic and Paleozoic

T.M. LIYANAGE*[1], L.M. VAN MALDEGEM[1], D. EDWARDS[2], C. BOREHAM[2], J.M. HOPE[1], J.J. BROCKS[1]

[1]The Australian National University, Canberra, Australia (*correspondence: tharika.liyanage@anu.edu.au)
[2]Geoscience Australia, Canberra, Australia

The C_{19}-C_{26} tricyclic terpanes are ubiquitous in oils and bitumens from a range of depositional environments and throughout the geological record. The precursor molecule and biological source of this series of biomarkers is unknown but, they constitute a large proportion of organic matter, highlighting the biological sources' ecological significance. Ratios of particular homologs are utilized to distinguish source rocks, assess post-depositional microbial degradation and to reconstruct paleo-environmental conditions [1], [2]. The C_{19}-C_{26} tricyclic terpanes are frequently described in the literature, however there is little known about the occurrence of the extended tricyclic terpane series (C_{27}-C_{54}) through geological history. Previous reports of the extended tricyclic terpanes are restricted to the Phanerzoic Eon and there is ongoing debate about their paleoenvironmental and biological interpretations [3],[4].

Here we present the first report of clearly indigenous tricyclic terpanes ranging from the Paleoproterozoic to the early Paleozoic Era. Extended tricyclic terpanes (>C_{27}) were detected in almost every sample analysed, highlighting their potential as paleoenvironmental parameters. Furthermore, our data infers a possible link between the extended tricyclic terpanes and depositional environment, allowing for the development of a novel proxy to help characterise ancient ecosystems. Additionally, this study provides new insights towards the enigmatic source of these orphan biomarkers.

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