

## New biomarker occurrences provide evidence for Neoproterozoic animals

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The earliest reported animal biomarkers, recorded in a ca. 100-Myr-long sequence of Neoproterozoic-Cambrian marine sedimentary strata from the South Oman Salt Basin [1], are unusual C<sub>30</sub> demosponge-derived steranes informally known as 24-ipc steranes (24-isopropylcholestane) and are the hydrocarbon remains of 24-isopropylcholesterols and structurally related sterols. Other than the 24-ipc steranes, no other diagnostic animal molecular biomarkers have been routinely applied to the geological record.

The discovery of other sponge biomarkers to augment the 24-ipc sterane record [1, 2] would strengthen the evidence for the presence of Neoproterozoic animals prior to the Cambrian Explosion of more complex animal body plans. Animal steroids containing unusually alkylated side-chains offer a high potential in this regard, and numerous demosponge genera are known to make a variety of unconventional steroids as secondary metabolites.

Detailed steroid assays on a large suite of extant sponges has yielded a number of new demosponge sterane biomarkers that can be used as target compounds to explore the Neoproterozoic and Phanerozoic geologic record. A latest important finding is a distinctive and novel ancient sterane biomarker, possessing a molecular skeleton which is uniquely found in some extant demosponges, in numerous Neoproterozoic-Cambrian sedimentary rocks and oils. This new biomarker evidence adds considerable weight and confidence that these are fossil biomolecules likely sourced from demosponges at least extending back to the interglacial Cryogenian Period.

[1] Love *et al.* (2009) *Nature* **457**, 718-722. [2] Brocks *et al.* (2016) *Geobio* **14**, 129-149.