Evolution of life in the Precambrian

PREREQUISITES
GEOS710 or GEOS920

SUPERVISORS / RESEARCH GROUP / PROJECT PARTNERS
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Organic Geochemistry group

RESEARCH PROJECT (Suitable for 2nd Year MRes or GEOS891)
A series of ARC and Agouron Institute-funded projects have enabled Simon George and colleagues to develop new ideas about the evolution of life during important time intervals in the Precambrian. The Great Oxidation Event (GOE) led to a greater oxygen content in the atmosphere and oceans, and we have been working on Pilbara rocks deposited just before this at 2.7Ga. Stromatolites were abundant, and hold a record of the early evolution of eukaryotes, based on work of PhD students Jessica Coffey and Yosuke Hoshino. Additionally, in 2012 very clean scientific drilling obtained cores through key sequences with unweathered material suitable for the geochemical search for biomarkers (PhD work of Carl Peters). We have a large collection of so far un-analysed stromatolites, and plenty of so far un-analysed unweathered shale/carbonate material that is suitable to construct a masters project around assessing hydrocarbons compositions in bitumen 1 and bitumen 2 fractions, and looking for biomarkers relevant to constraining what type of life existed prior to the GOE.

Additionally, we have commenced investigation of the evolution of early metazoans (animals such as proto-sponges) using material from the Flinders Ranges and Namibia. We have a large set of material from Arkaroola, including clastics and carbonates, some of which contain possible sponges. There is an opportunity to build on the work started by 2015 MRes student Shirin Baydjanova, investigating the organic matter in these rocks using biomarker and spectroscopic techniques. This project is in collaboration with Malcolm Wallace at the University of Melbourne.

Figure: Carbonate and pyrite fillings in microfractures of a black shale (AIDP-3, Jeerinah Formation, Pilbara); possible sponge fossils in the Cryogenian Balcanoona Formation, Flinders Ranges.