# Widespread putrefaction in sediments after the Palaeoproterozoic Great Oxidation Event

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The effects of the Palaeoproterozoic Great Oxidation Event (GOE) were widespread and diverse, and included extensive oxidation of organic matter (OM) in Gabon and N.W. Russia. However, little is known about the global extent of this event and the sedimentological changes after the GOE. Here we show global occurrences of late Palaeoproterozoic macroscopic concretions, millimetric granules, microscopic rosettes, and other self-similar mineralogical spheroids that have spheroidally-concentric layers of diagenetic minerals. Diagenetic spheroids commonly contain apatite, carbonate, OM, pyrite, and/or ferric-ferrous phyllosilicates and oxides, and therefore possess compositions expected from the mineralization of decomposed biomass with various oxidants. These rocks are also associated with $^{13}$C-depleted carbonate, which further demonstrates that oxidation of biomass occurred during diagenesis. Their organic matter has highly variable crystallinity, molecular functionality, and C-isotopic composition characteristic of microbial ecosystems variably dominated by primary or secondary productivity. The presence of trace levels of sulphate, halogens, and carboxyl functional groups bonded to variably oxidised OM in diagenetic spheroids, lead to the proposition that chemically-oscillating reactions, which also form circularly-concentric and self-similar patterns, best explain all the observations of authigenic and diagenetic mineral spheroids. Hence, we conclude that the rise of diagenetic spheroids during the late Palaeoproterozoic, was caused by widespread decomposition of biomass.