

Preservation and evolution of life across oceanic anoxic events

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Oceanic anoxic events (OAEs) are sediments that contain high amounts of organic matter deposited under oxygen-depleted conditions. Often Concretions are often preserved in sediments associated with OAEs and can contain encapsulated fossil remains (e.g., bones, soft tissue). Concretions formed under highly reduced conditions allow for exceptional preservation of soft tissue and biomolecules (e.g., cholesterol). Concretions were formed over long geological time spans, but have never been studied in sufficient detail by organic–inorganic approaches that we have applied here. With access to concretions from several worldwide *Lagerstätte* locations (e.g., Lower Jurassic Posidonia Shale, NW Germany; The Devonian Gogo Formation, Western Australia) and the surrounding sedimentary shales- organic (biomarkers, biomolecules and stable isotopes, inorganic geochemistry and morphology) reveal the extent of preservation of cholesterol and the entire diagenetic continuum as-well as exceptionally well preserved cells from sediments deposited under photic zone euxinic conditions providing insights into the development and evolution of life (including highly important cellular remains).