

Early Mesozoic seeps and the advent of modern seep faunas

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The early Mesozoic seeps are known from three localities worldwide. The oldest (Norian, Late Triassic) are two carbonate bodies from eastern Oregon dominated by dimerelloid brachiopod *Halarella*. Additionally rare bivalves (numerous *Halobia*, some nuculanids, single *Nucinella*-like bivalve, and single permophorid) and single "conical gastropod" were reported. From the same region another seep dated as Late Sinemurian, Early Jurassic is described. It is also dominated by a species of a superabundant dimerelloid brachiopod *Sulcirostra*. The faunistic composition of both sites is strongly reminiscent of many Paleozoic seeps dominated by dimerelloid brachiopods. We found an entirely different composition in the Toarcian, Early Jurassic hydrocarbon seep deposits in Argentina. This locality (called La Elina) is known since 2003 when very negative $\delta^{13}\text{C}$ values (-33‰) and several fabrics typical for seep carbonates were reported but no macrofaunal assemblages apart from worm tubes were unearthed. We re-visited this locality and collected several molluscs associated with the seep carbonate. The most common and diversified are molluscs and worm tubes. We identified several gastropods (two cylindrobullinids one pleurotomariid, and the oldest-known species of neomphalids, paskentanids, and hokkaidoconchids) and many bivalves (lucinids, nuculids, solemyoids, *Otapiria*, numerous *Bositra*) but no brachiopods. Therefore, the seep at La Elina is the oldest-known seep with modern aspects, i.e., the fauna is dominated by molluscs and not brachiopods and it also yields the oldest seep occurrences of several mollusc groups (neomphalids, paskentanids, hokkaidoconchids, and lucinids) known from Late Mesozoic and younger seeps.