

EARLY PALEOZOIC REEFS: THE MISSING MID-CAMBRIAN TO MID-ORDOVICIAN GAP AND O/S BOUNDARY EXTINCTION INTERVAL

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Following the Toyonian (end Early Cambrian) mass extinction of the archeocyath-microbial reef ecosystem, reefs underwent a ~55Ma long recovery phase that extended until the Middle Ordovician (late Llanvirn). During this interval microbial-lithistid sponge reefs were relatively widespread, though spatially not significant, and are now reported from Eurasia (Iran, China), Australia, Antarctica, South America (Argentina) North America (particularly the western carbonate margin). Bryozoans, primitive tabulate corals, and simple stromatoporoids began to fill a carbonate-secreting role in the equatorial reef ecosystem by late Llanvirn time. In the Late Ordovician (Caradoc) the colonial rugose corals and more advanced tabulates evolved rapidly, sporadically developing among the first truly 'coral patch reefs', though none appear to have been built on the large scale of mid-Paleozoic reef belts, even through the Ashgill. Rich and diverse coral thickets, associated with flourishing chloralgal receptaculitid, and extensive shelly nautiloid-brachiopod communities, also inhabited widespread low latitude, tropical carbonate shelf areas in the Late Ordovician of North America, without building reefs. Silurian coral elements were introduced into reef habitats during the Ashgill (especially in the interglacial interval of the Gamachian/Hirnantian). The double latest Ordovician cooling events (end-Richmondian, end-Gamachian/ Hirnantian), tied in to Saharan glaciation and two sealevel drawdowns, did not appear to have had a major impact on reef faunas, most of which recovered to lead the Early Silurian reef renewal and expansion.