

Biofacies of Late Callovian Bioherms of Saudi Arabia

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ABSTRACT

The biofacies distribution of a bioherm buildup is documented for the first time in the regressive part of a late Callovian parasequence in Tuwaiq Mountain Formation (TQMF) outcrop. The late Callovian Daddiyah Member (T3) displays the first development of stromatoporoid-coral bioherms that persist to the top of TQMF. The top of TQMF forms a flat plain with bioherms forming small hills that have an average diameter:height ratio of 8:1. In road cuts, the bioherms can be seen to prograde to the east in stacked parasequences. The sampled bioherm is 20 feet high and 60 feet wide, with a distinct bed of lenticular chert located at its base. Bioherms are flanked by branched elevator stromatoporoids assigned to *Shuqria* spp. Closely-spaced samples from three vertical traverses within a single bioherm reveal the presence of a variety of microfossils, including *Nautiloculina*, *Quinqueloculina*, and *Siphovalvulina* with a chert bed at the base representing the dissolution of sponge spicules and their subsequent recrystallization at the maximum flooding surface of the stromatoporoid-dominated parasequence. Samples from the central part of the bioherm are characterized by the presence of stromatoporoid and coral fragments, sponge spicules and foraminifera assemblages in the uppermost part. The presence of foraminiferal assemblages is considered to represent a transitional phase between the stromatopoid build-up and the overlying prograding lagoonal sediment. Two additional sections on both flanks of the bioherm, revealed a marked difference in abundance and diversity of foraminifera suggesting different sedimentary settings; lagoonal sediments to the west and open marine sediments to the east. The increase in microfossil diversity on the western flank of the bioherm represents lower energy conditions that were more advantageous for the establishment of foraminifera while the eastern flank was not. This study is of significance because it provides a standard biofacies progression within a stromatoporoid bioherm-dominated sequence deposited during the late Callovian. In addition, this study highlights the ability to determine and confirm the general depositional settings of TQMF using bioherms.