A Petrographic Analysis of the Microbial Thrombolite Buildup in the Oxfordian Smackover Formation, Little Cedar Creek Field, Alabama

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The discovery of hydrocarbons in the Smackover Formation in the Little Cedar Creek Field, Alabama in 1994 piqued interest with researchers. The established stratigraphic framework for this region allows the exceptional opportunity to carry out detailed microfacies analysis of the microbial thrombolitic component in the Jurassic (Oxfordian) buildups through core description, thin-section, and isotopic analysis to identify the succession of organisms, microbial carbonate deposition, and diagenesis that contributed to formation of these thrombolite buildups. The Little Cedar Creek Field parallels the up dip limit of the Smackover Formation approximately 3.2 km (2 miles) away. Based on the cores used in this study, the Smackover was intercepted at depths ranging from 3,321.4 to 3,567 meters (10,897-11,703 feet) and contains buildups 2 to13 meters (7-42 feet) thick. Five microfacies were defined (brown laminated, repeating centimeter -scale cycles, chaotic, black *Renalcis* like-layers/dendritic structures, and dark lens shapes). In a few instances small sponges form a primary framework, but in most of the buildup, distinct layers of microbially precipitated micrite forms in succession one on top of the other. Because Jurassic microbial carbonates are important hydrocarbon reservoirs of global interest, understanding these complex thrombolitic buildups, can help explain variation in reservoir quality.