influences shapes and sizes of modern foraminifera.

By analogy, assemblage composition, including the presence and abundance, or absence, of planktonic and smaller benthic species, along with shapes and size distributions of the larger foraminifera, can be used in paleodepth analysis and to supplement other petrographic evidence in carbonate facies interpretation.

Among the current limitations of the use of larger foraminifera as paleodepth indicators are the complications caused by taxonomic heterogeneity of both the larger foraminifera and their algal symbionts. Nevertheless, the potential for use of larger foraminifera in paleoenvironmental analysis is tremendous, as is the potential benefit of further studies of both modern and ancient assemblages of larger foraminifera.

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Facies Analysis and Petroleum Potential of Smackover Formation, Western and Northern Areas, East Texas Basin

The Smackover Formation (Upper Jurassic) in northeast Texas is a transgressive-regressive carbonate sequence which has been extensively dolomitized. The extent of dolomitization is directly related to the presence of the overlying Buckner anhydrite which has provided the magnesium-rich brines necessary for dolomitization.

The Smackover Formation is subdivided informally into a lower and upper member based on distinctive lithologic characteristics. The lower member, which rests conformably on the fluvial-deltaic sandstones of the Upper Jurassic Norphlet Formation, contains a laminated, organic carbonate mudstone facies that grades into an overlying locally fossiliferous, pelletal-micritic facies. The vertical sequence of facies indicates a transgression of the sea. They are interpreted to represent an inter-tidal mudflat to shallow-marine, low-energy platform or protected lagoonal environment. The upper member of the Smackover Formation consists mainly of broken skeletal debris and pelletal allochems in a micritic matrix. The sediments are better winnowed and better sorted upward in the sequence. Interbedded with and overlying the skeletal-pelletal facies is a clean well-sorted dolomitized oolitic-grainstone facies. This uppermost informal member marks the beginning of a progradational sequence which lasts throughout the remainder of Smackover deposition and continues through deposition of the evaporites and red beds of the overlying Buckner Formation.

Deposition of the Smackover Formation most closely resembles Holocene carbonate sedimentation in the southern Persian Gulf. Both areas are represented by a similar carbonate ramp depositional framework together with closely approximated salinity and climatic conditions.

Most of the Smackover production in northeast Texas occurs along the Mexia-Talco fault zone in the deeper gentle salt-related anticlines and salt-graben systems. Reservoir rocks are primarily leached and dolomitized oolitic grainstones and dolomite. Laminated organic carbonate mudstones which characterize the lower, transgressive phase of the Smackover Formation provide an excellent source rock for petroleum.

Exploration targets for the Smackover Formation are the areas where dolomitized oolitic and skeletal grainstones occur on top of structurally high areas such as over salt ridges or swells in the deeper portions of the basin. Along with this are those areas along the updip limit of the Smackover Formation in which the upper member has been leached and dolomitized and occurs in a stratigraphically favorable position.

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Aragonite Crusts and Pisolites Beneath Dolomitic Tepees, Lake MacLeod Evaporite Basin, Western Australia

Research currently being conducted by the Sedimentology and Marine Geology Group, under Brian W. Logan at the University of Western Australia, has recently concentrated on Lake MacLeod, a 2,000 km^2 (770 mi^2) coastal salina on the western coast of Australia. This work has shown that this evaporite basin, which is 3 to 4 m (10 to 13 ft) below sea level, is separated from the Indian Ocean by a topographic barrier, but seawater under hydrostatic head, seeps freely through the barrier and discharges from several vents and springs in a carbonate mud flat at the north end of the basin. From there, seawater flows slowly across the basin, evaporating and depositing carbonate, gypsum, and ephemeral halite. About 10 to 12 m (33 to 39 ft) of evaporites have been deposited in the past 5,300 years.

In July 1982, the authors visited the carbonate mud flats and discovered abundant aragonite pisolites and botryoidal-mammillary crusts of fibrous aragonite cement beneath "lily-pad" tepee slabs of cemented protodolomite. This protodolomite host-rock is well-lithified, intraclast, peloid packstone with abundant coarst fenestrae. Thick aragonite crusts cover both the undersides of "lily-pad" slabs and the lithified floors of tepees. Crusts covering the floors are more botryoidal and consist of both aragonite nubs and mounds (0.2 to 2.5 cm, 0.08 to 1 in., in diameter), and a few scattered, loose pisolites, several millimeters in diameter. Pisolites are composed of multi-generation fibrous layers of square-tipped aragonite rays surrounding peloid-intraclast nuclei. Thus, it seems that periodic deposition of a fine layer of carbonate mud, peloids, and intraclasts across the floor of a tepee is a prerequisite to pisolite growth.

Stable isotope analysis of the host rock and aragonite cements gave expected marine values ($\delta^{18}O = +0.25$ to $+1.14$ PDB and $\delta^{13}C = -0.18$ to $+0.16$ PDB) and reflect precipitation from ground water (marine composition) discharging from seeps in the carbonate mud flats.

The manner in which crusts, pisolites, and tepees occur at Lake MacLeod raises the possibility that they and their ancient counterparts from the Permian basin share a common origin. Perhaps Permian pisolites and aragonite crusts formed beneath cemented slabs of peritidal sediments in tepees bathed by marine water which seeped across exposed portions of the shelf crest.

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Depositional Environments in an Alluvial-Lacustrine System: Molluscan Paleoecology and Lithofacies Relations in Upper Part of Tongue River Member of Fort Union Formation, Powder River Basin, Wyoming

The upper part of the Tongue River Member of the Fort Union Formation (Paleocene) in the northern Powder River basin, Wyoming, contains assemblages of excellently preserved nonmarine mollusks which occur in laterally continuous outcrops of diverse lithologic sequences and sedimentary structures. These attributes offer a unique opportunity for interdisciplinary interpretation of depositional environments based on molluscan paleoecology and lithofacies relations. Taphonomic histories of mollusk assemblages as reflected by molluscan biofabric (size,