point microporosity of 5 to 10% are found within the fine-grained skeletal grainstones. Fracture porosity enhances permeability in several facies. Moldic and vuggy porosity types are generally secondary whereas intraparticle porosity may be preserved primary. Pinpoint microporosity is probably matrix related secondary porosity. Coarse equant calcite commonly occludes intraparticle, moldic, vuggy, and fracture porosities. Dolomitization within the "reef" limestones may have acted to create or preserve porosities.

Poor production from the Glen Rose reef trend has been attributed to the lack of structural closure. Use of all available electric logs and sample logs in conjunction with extensive core and thin section analysis should provide new insight on carbonate diagenesis and the relationship to porosity-permeability trends within the Glen Rose reef trend.

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Depositional Microfacies and Burial Diagenesis of Upper Jurassic Cotton Valley Limestone, Teague Townsite Field, Central Texas

The Cotton Valley Limestone, like the older Smackover, was deposited on a ramp where the monotonous regional topography was punctuated by salt-generated and basement highs that greatly influenced local depositional environments. Teague Townsite field is located above a salt ridge that was once divided into several domes where Cotton Valley grainstones were deposited. Open marine wackestones and packstones surrounded those oolite shoals and, updip, shaly wackestones were deposited in a more restricted environment. An overall increase upward in the carbonate grain/mud ratio resulted from a Late Jurassic regional regression. Nine smaller, shoaling-upward cycles are present in the study area; they probably reflect local salt movements. The reservoir at Teague Townsite field is mainly intraparticle porosity formed by early leaching of metastable allochems in the meteoric phreatic environment that was contemporaneous with several of the periods of local emergence. Interparticle porosity was filled early by equant and bladed cements. Neomorphism and replacement were common in early diagenesis. Subsequently, compaction, stylolitization, sparite cementation, and introduction of saddle dolomite occurred. Whole-rock analyses indicate that the present-day trace element distribution reflects (1) early cementation and flushing of porous zones; (2) comparatively less flushing of muddy zones; and (3) introduction of subsurface fluids. Whole-rock $\delta O^{18}/\delta C^{13}$ values plot within the range of published data for "typical Jurassic cements." The average δO^{18} values are -5 and the δC^{13} values are $+2.5$ PDB. A tendency toward "heavier" isotopic composition with increasing depth is interpreted to be the result of subsurface fluid influx during burial diagenesis.

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Storm-Generated Accumulation of Nummulite Banks in Eocene of Cairo, Egypt

Nummulite banks which are common in neritic and shelf-edge facies in many parts of the Tethyan Eocene have been mainly regarded as reef-type buildups so far. However, stratification and biofabrics of such banks in the middle Eocene around Cairo demonstrate the importance of physical processes in molding nummulitic sediment bodies.

Initiation of a nummulite bank at the Giza Pyramids Plateau is localized by a preexisting paleohigh, inherited from Late Cretaceous tectonism. On this "submarine swell" (about 1 × 1.5 km wide), ecological conditions were optimal for a flourishing *Nummulites gizehensis*-community, resulting in greater sediment production than in adjacent environments. Growth of the nummulite bank into a sediment body over 30 m (98 ft) in thickness and more than 1 km (.62 mi) in length is strongly enhanced by mechanical concentration of nummulite tests into coquinal packstones. These are interpreted to be a product of storm-generated winnowing. Paleoecological evidence shows that nummulite banks are largely an in-situ lag deposit. Periods of nummulite settlement are episodically disturbed by "catastrophic" storm events, which result in winnowing and local accumulation of the heavier bioclasts. Upward growth of the banks into shallower water is reflected by an increase in winnowed fabrics and by a cap of shoal calcarenites. During shallowing, patch reefs and a back-bank lagoon formed on the landward side of the bank.

This facies association may be regarded as a model for hydrocarbon reservoirs. The high intraparticle porosity in nummulite tests (54%) makes the banks a potential reservoir, while adjacent and overlying lagoonal mudstone and wackestone may serve as source and cap rocks.

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Origin and Genesis of Fracture Porosity in Viola Limestone (Ordovician)

Analysis of surface exposures of the Viola Limestone is important to understanding Viola oil and gas production trends in the Marietta basin of southern Oklahoma. Surface exposures of the Viola Limestone in the Arbuckle Mountains and Criner Hills of Oklahoma indicate a critical dependence of fracture development on structural position and lithology. Maximum fracturing occurs in tensional zones along fold crests, rather than in areas characterized by intense compressional stress. Fracturing also appears to be related to lithology. The basal, cherty unit has a fracture density approximately two to four times greater than that of the upper, more calcareous units. These relationships could be important to understanding oil and gas occurrence in the Viola Limestone, because the same controls may dictate distribution of fracture porosity in the subsurface.

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Textural Controls on Sandstone Diagenesis

Diagenetic alterations of sandstone occur in a continuous system. As a result, equilibrium thermodynamics cannot be strictly used to describe the equilibrium composition of the diagenetic system and the resulting course of diagenesis. If a geologist is to predict the course of diagenesis in a meaningful way, he must determine those factors which serve to control the various diagenetic pathways.

Geologic evaluation of sandstone fabric and texture is an integral part of most regional studies. These data are often critical in understanding diagenesis as well. Sediment grain size, roundness, sorting, and packing factors determine the ability of a sandstone to transmit fluid during the course of burial and diagenesis. These geologic factors can be used to evaluate the paleohydrol-