this assumption is the assemblage of abundant *Lenticulina* and *Globigerina* genera, and common occurrence of *Uvigerina, Nonion,* and *Cibicides* genera. This typical assemblage indicates a paleodepth of 90-300 m, which is analogous to depth ranges of extant foraminifera of the Gulf of Mexico. Further evidence of an outer-shelf to upper-slope depositional environment is the benthic to planktonic ratio of 4:1, a common ratio found in modern foraminiferal assemblages of the Gulf of Mexico at these depths.

Rare specimens of *Textularia* and *Globulina* genera present in the assemblage may have been displaced downslope of their natural habitat via ocean currents or influx of fluvial discharge from the Eocene age Cape Fear River.

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Depositional and Diagenetic Aspects of Siliciclastic and Carbonate Reservoirs in Glorieta Formation (Permian), Northern Midland Basin, Texas

The Glorieta formation is oil productive in the northern Midland basin. Production through 1982 totaled over 25 million bbl of oil. Carbonate as well as siliciclastic facies are productive in different locations on the shelf. This production is largely diagenetically controlled, with secondary porosity enhancement prevalent in both clastic and carbonate reservoir types.

The Glorieta formation is composed of cyclicly deposited siliciclastics, carbonate, and carbonate-evaporite units. Environments of deposition range from supratidal sabkha through shallow subtidal to open-marine conditions. The siliciclastics are eolian-derived sediments that prograded onto the shelf of the northern Midland basin. The overall coarsening-upward sequence, the gently seaward dip of the clastics, and the open-marine characteristic of adjacent carbonate sediments suggest a subaqueous deposition similar to that described by Shinn along the leeward, southeast coast of Qatar Peninsula in the Persian Gulf.

Diagenetic features affecting porosity development in the siliciclastic intervals include etching of quartz grains and penecontemporaneous precipitation of pore-filling, poikilotopic anhydrite cement. Subsequent partial dissolution of anhydrite cements increased porosity in clastic reservoir facies. The carbonate units have undergone pervasive dolomitization of mud matrix, leaching of allochems, and extensive anhydrite void filling. Replacement of dolomicrite by anhydrite and later solutioning of replacement fabric anhydrite contributed to secondary porosity in carbonate reservoirs. A better understanding of these diagenetic relationships could aid in predicting porosity trends in these distinctly different reservoir types within the Glorieta formation.

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Wrenching and Oil Migration, Mervine Field, Kay County, Oklahoma

Since 1913, Mervine field (T27N, R3E) has produced oil from 11 Mississippian and Pennsylvanian zones, and gas from 2 Permian zones. The field exhibits an impressive asymmetric surface anticline, with the steeper flank dipping 30°E maximum. A nearly vertical, basement-involved fault develops immediately beneath the steeper flank of the surface anticline. Three periods of left-lateral wrench faulting account for 93% of all structural growth: 24% in post-Mississippian–pre-Desmoinesian time, 21% in Virgilian time, and 48% in post-Wolfcampian time.

In Mesozoic through early Cenozoic times, the Devonian Woodford Shale (and possibly the Desmoinesian Cherokee shales) locally generated oil, which should have been structurally trapped in the Ordovician Bromide sandstone. This oil may have joined oil already trapped in the Bromide, which had migrated to the Mervine area in the Early Pennsylvanian from a distant source. Intense post-Wolfcampian movement(s) fractured the competent pre-Pennsylvanian rocks, allowing Bromide brine and entrained oil to migrate vertically up the master fault, finally accumulating in younger reservoirs.

Pressure, temperature, and salinity anomalies attest to vertical fluid migration continuing at the present time at Mervine field. Consequently, pressure, temperature, and salinity mapping should be considered as valuable supplements to structural and lithologic mapping when prospecting for structural hydrocarbon accumulations in epicratonic provinces.

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Geophysical Model of Gravity-Magnetic High, Virginia Coastal Plain

The Coastal Plain province of Virginia is characterized by a coincidental gravity and magnetic high parallel with the northeast-southwest Appalachian trend in the north changing to a north-south trend in the south. Both ends of the anomaly steeply grade into the regional field in Maryland and North Carolina.

Interpretation of 2 cross-strike geophysical profiles indicates that the anomaly is due to a high-density mafic unit flanked by low-density granitic(?) units. Geophysical signatures to the east of the anomaly are not parallel with Appalachian regional trends that characterize areas to the west.

Gravity models extending to 3 km depths on the southern profile (parallel with I-64 USGS line) and 4 km on the northern profile were chosen experimentally for optimal estimation of density contrasts. First approximations of the profile using vertical blocks to obtain density contrasts showed that east-dipping ($\approx 60°$) crustal blocks better represent the data. Well logs show that the anomaly is characterized by metagabbro, metabasalt, and amphibolite flanked by coherent lower-density granitic crustal blocks. Triassic-Jurassic clastic basins on the flanks of the anomaly to the west are fault-bound, but occur as vast basin infills to the east.

A conceptual model suggests that the anomaly may represent a suture zone between the North American crustal block to the west and possibly a remnant Avalonian(?) microplate to the east. Marked lineaments observable on computer-enhanced Landsat images closely parallel the subsurface trend of the anomaly.

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Experimental Fabric-Selective Porosity in Phylloid-Algal Limestones

Secondary fabric-selective porosity was experimentally produced in Pennsylvanian phylloid algal limestones from the outcrop in southeastern Kansas and from the subsurface in southeastern Utah (Ismay field, Paradox basin). Plastic-jacketed cylindrical specimens of well-cemented limestones were subjected to pressures simulating burial at 12,000 and 15,000 ft in a specially designed triaxial apparatus that permitted circulation of weakly acidic (pH 6) pore fluid (CO_2-enriched distilled water) under constant pressure and temperature. Thin sections revealed that the experiment produced algal moldic pores by selective dissolution of coarse low-magnesian calcite cement and pseudosparite. Dissolution was initiated along intercrystalline and intracrystalline pores (crystal boundaries and cleavage planes). Experimental pore systems were identical to natural porosity in Ismay reservoirs. Moldic porosity formed in the early stages of tests when flow rates were slowest; prolonged experimentation and more rapid rates of fluid circulation promoted the formation of vugs and channels.

These experiments document, for the first time, a potential for moldic-porosity formation during late diagenesis in deeply buried, mineralogically homogeneous phylloid algal limestones; thereby, extending the known depth range for porosity in late Paleozoic algal carbonates. Reservoir-quality algal moldic porosity may, therefore, exist within deep, as yet undrilled, parts of basins where mesogenetic decarbonatization has been operative.

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Sedimentary and Reservoir Geology of Upper Cretaceous Doe Creek Sandstone, Alberta, Canada

Northwest of Edmonton, Alberta, in the Valhalla area, recent drilling has proven the Upper Cretaceous Doe Creek Member of the Kaskapau Formation to be an oil-bearing sandstone. Based on core examination, the oil-bearing sandstone is interpreted to have been deposited on the transition from lower shoreface to inner shelf adjacent to a progradational wave-dominated coastline. Mapping indicates a northeast-southwest-trending reservoir sandstone body. The reservoir sandstone is a well-sorted fine-grained sublitharenite. The principle framework min-