tary bays, and subaqueous distributary-mouth bars. The living specimens exhibit a primary habitat preference for levee localities, with a subsidiary preference for interdistributary bay locations. This distribution pattern is reflected by the dead forms. Living representatives belong to three families, three genera, and 10 species out of a total of four families, four genera, and 15 species retrieved. *Mississippiella multiapertura*, n. gen., et n. sp., is described and assigned to the Family Paraquadrulidae. Interactions between measured environmental parameters most frequently involve dissolved oxygen in the four subenvironments. This observation suggests that this parameter is of prime importance in deltaic ecology. However, no single ecologic parameter could be identified as the causative control to thecamoebinid distribution. The living thecamoebinids appear to be tolerant of significant variation in turbidity, temperature, and alkalinity. The living forms indicate a preference for moderately oxidized to oxidized, low-saline to fresh waters associated with reducing to highly reducing bottom conditions. Taxa occurrences are plotted on probabilistic ternary diagrams in order to differentiate the microfaunas characteristic of the various subenvironment traverses, and on probabilistic target plots for microfaunal differentiation of the subenvironments.

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Effects of Syndepositional Structures on Lower Vicksburg (Oligocene) Fluvial-Deltaic Sedimentation, McAllen Ranch Field Area, Hidalgo County, South Texas

The lower Vicksburg sandstones of the McAllen Ranch field area (including McAllen Ranch, Santa Anita, and Guadalupe fields) in south Texas have been significant gas producers for almost 4 decades. However, the relationship of syndepositional structures to the type and distribution of depositional systems is still not fully understood. The importance of growth faults, especially major regional faults, has long been recognized. Further detailed studies concentrating on deeper sandstones of the Vicksburg Formation indicate that these faults in the lower Vicksburg are characterized by low-angle fault-planes and greatly expanded stratigraphic intervals with plunging rollover structures on the downthrown fault blocks. Greatest stratigraphic expansion is associated with channel-mouth bar or delta-front facies.

Extensive drilling and acquisition of high-resolution seismic data in this area have provided the necessary stratigraphic control to determine the significance of more subtle structural effects on sedimentation. The present study is based on the analysis of 142 well logs, 10 cores, and several seismic lines.

The information from cores, characteristic log patterns, and net-sandstone maps of discrete genetic subunits strongly suggests a high-constructive deltaic origin for the reservoir facies. The maps show areas of rapid subsidence associated with large-scale mud movements. These movements result in the formation of sediment-withdrawal basins and fringing syndepositional anticlinal ridges. The localized basins have a profound effect on the style of deltaic sedimentation. Most significant is the exceptional thickening of the distal delta-plain facies characterized by interdistributary bay mud and crevasse splay sands. The splay sands contain abundant macerated plant material. Individual splays have a limited lateral extent, are stacked vertically, and form complex imbricated sand bodies which are gas-prone stratigraphic traps. Such an area presents an ideal target for explorationists and a complex set of problems for the production staffs comtemplating secondary recovery projects.

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Reactivation of Fault Movement, Tepetate Fault Zone, South-Central Louisiana

The Tepetate fault zone consists of a series of faults trending east-west along the northern margin of the South Louisiana salt dome basin. The fault is known to be currently active in the Baton Rouge area, where it has fractured and displaced pavement and foundations. Detailed subsurface mapping of the fault zone in an area of Pointe Coupee Parish to the west reveals that there have been two distinct periods of growth faulting, separated by a long period of inactivity. The first period of fault activity occurred during the time from Wilcox (or earlier) to Frio deposition. There then followed a period of quiescence characterized by deposition of nearly 8,000 ft (2,400 m) of fluvial sands and shales, primarily of Miocene age. In more recent times, probably Pleistocene, the fault has been reactivated, and up to 40 ft (12 m) of additional displacement has occurred in the area studied. Of concern is the fact that a site near this fault has been proposed for the surface and subsurface disposal of hazardous wastes.

Recognition of the interruption and reactivation of growth faulting in south Louisiana is of considerable importance with regard to problems of regional structural evolution, fluid migration, and the siting of surface and subsurface waste-disposal facilities. Because of difficulties in subsurface correlation, faults of small displacement in fluvial sequences can easily be overlooked. Further detailed study, however, is warranted.

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Misinterpretation of Environmental Monitoring Data—a Plague on Mankind

All too often, data collected as part of environmental monitoring programs are subjected to interpretation by those unqualified to do so, frequently with results that require extensive litigation. A recent example involved a study carried out in Mobile Bay where geochemical data were used by certain individuals to "identify" bottom sediments contaminated by the drilling of an exploratory well. Elevated barium contents of up to several hundred ppm near the mouth of the bay were attributed to the spillage of drilling mud, although all drill cuttings, mud, and effluent from the rig had been pumped directly onto barges for disposal at sites onshore. Unfortunately, those making the allegations failed to carry out two analyses on the sediments that would have identified the true source of the barium. First, the sediments should have been X-rayed to determine if the barium was, in fact, the result of barite (subsequent diffractograms were all negative for barite). Second, the actual source of the barium could have been determined. Chemical "stripping" techniques now allow the elements in an analysis to be partitioned into: (1) a pore-water fraction, (2) an exchangeable ion phase, (3) ions associated with disseminated carbonate minerals, (4) ions associated with iron and manganese oxide phases, (5) ions attached to clays as organometallically chelated compounds, and (6) ions held in structural sites in the clay mineral lattices.

Partitioning of the barium in the Mobile Bay sediments disclosed that most was associated with the various clay-mineral phases and substitutional impurities in shell material. Thus, the barium observed was not the direct result of the drilling operation but rather reflected its common association with disseminated oxides in the bottom muds, as a chelated form adhering

to the clay platelets and as replacement ions in the lattice of carbonate minerals. Samples obtained from near the mouth of the bay contained a greater amount of shell material, and, therefore, the barium contents were expectedly higher.

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Composition and Diagenesis of Upper Cretaceous San Miguel Sandstone, Northern Webb County, Texas

In northern Webb County, Texas, the Upper Cretaceous San Miguel Formation of the Maverick basin contains sandstones that range in composition from feldspathic litharenites to lithic arkoses. Data include petrographic analysis of sidewall cores from two wells and cuttings from two additional wells. Volcanic rock fragments represent the predominant lithic constituents and consist of trachytic keratophyres. Plagioclase phenocrysts occur in a trachytic groundmass of albite-oligoclase laths and microlites.

Known Late Cretaceous volcanics, which have been reported from eruption centers to the north and northwest, consist of labradorite-olivine-basalt, nephelite-melilite "basalts," phonolite, nephelinite, and serpentinized basalts. This assemblage suggests that the keratophyric grains were derived from a different volcanic province. The most likely potential source areas for these keratophyric volcanic centers existed to the west or southwest, probably in Mexico. No Late Cretaceous keratophyric volcanics have been reported within this area. Perhaps such eruption centers did exist in Mexico and subsequently were buried or obscured by Cenozoic volcanic centers.

Sandstones from the superjacent Olmos Formation, in the same area, contain only 5 to 10% keratophyric rock fragments. This small percentage suggests that the keratophyric volcanic center had become dormant or extinct by the end of San Miguel "time," and the eroded volcanic centers were shedding much less debris during Olmos "time."

Major porosity-occluding cements in the San Miguel are chlorite, kaolinite, and ferroan calcite. Much secondary porosity was created by partial to complete solution of plagioclase and volcanic rock grains. In many intervals large primary and secondary voids are lined by chlorite and filled by kaolinite.

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Jurassic Petroleum Geology of Southwestern Clarke County, Mississippi

Electric logs from wells in southwestern Clarke County, Mississippi, illustrate the structural and stratigraphic relations which affect hydrocarbon production. The fields studied (West Nancy, Nancy, East Nancy, Prairie Branch, and Lake Utopia) are coincident with salt-cored structures and are aligned from northwest to southeast, parallel with the updip limit of the salt. Production depths increase basinward and southwesterly. The fields produce from primary porosity in oolitic grainstones of the upper Smackover Formation. Prairie Branch and East Nancy also produce from siliciclastic sands of the underlying Norphlet Formation, whereas West Nancy has additional production from oolitic grainstones of the overlying Buckner Member of the Haynesville Formation.

The general depositional sequence that controlled hydrocarbon accumulations is: deposition of siliciclastic sands of the Norphlet; accumulation of carbonate muds of the lower Smackover and initiation of salt movement; and formation of offlapping shingles of oolite sands of the upper Smackover on faulted salt-cored structures. Structural movement was complete by the end of Haynesville deposition. Hydrocarbon migration most likely occurred during Haynesville deposition, because most Smackover and Norphlet pay zones coincide with Smackover highs and not with Haynesville structures.

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Gray Sandstones (Jurassic) in Terryville Field, Louisiana—Basinal Deposition and Exploration Model

Deep (~ 13,000 ft, 4,000 m) hydrocarbon production at Terryville field is from various zones within Upper Jurassic siliciclastics that are referred to informally as the "gray sandstone" section. This sequence of interbedded sandstones and shales occurs in the Smackover section or within the lower Bossier shale seaward of the Upper Jurassic shelf edge, and is correlative to and coeval with inner shelf facies deposited north of the field area.

The "Gray" section at Terryville field consists of at least four sandstone bodies separated by black shales and silty to sandy shales. The shales are thinly bedded and harbor a locally abundant ichnocommunity of *Chondrites, Planolites,* and *Scalarituba*; small ammonoids and bivalves are present locally in these beds. Thin layers and lenses of sandstones (lenticular and flaser bedding, partial Bouma sequences) are intercalated with the shales locally, and commonly are heavily bioturbated by *Teichichnus* and *Arenicolites.* The sandstones are fine grained, feldspathic sublitharenites, locally conglomeratic (shale clasts), with rare ooids and comminuted skeletal fragments. The four sandstones in the field area are of stacked, lobate geometry. The lobes consist internally of anastomosing lenses of sandstones and conglomeratic sandstones interbedded with and replaced laterally by shales and sandy shales. The long axes of these lobes and lenses are oriented normal to regional upper Smackover shelf-edge trends. Stacked "megasedimentation packages" are recognized within each sandstone lobe. These packages consist internally of repetitive second-order sedimentation units, including partial Bouma sequences, locally conglomeratic graded beds (normal and reverse), massive textureless beds, and coarse rhythmites. The thickness and internal grain size of these component units have a tendency to decrease systematically upward from the base of and laterally within each megasedimentation package. Stacked packages within and immediately surrounding the depoaxes of each lobe coarsen upward from repetitive units of sandstones to conglomeratic sandstones.

The areal distribution, vertical stratigraphy, geometry, bedform characteristics, and texture of the "Gray" sandstones, and their regional relation to upper Smackover carbonate facies to the north, suggest their formation as progradational submarine-fan complexes deposited in a basinal environment. The sandstones and conglomeratic sandstones are interpreted as braided distributaries and associated facies deposited in upper and midfan environments. At distances from these distributaries, the thinner sandstone packages and the interbedded shales and sandstones represent proximal overbank to midfan deposits. The intervening shales are interpreted as basin plain and distal overbank deposits.

Although trapping at Terryville field is mainly structural, sandstone trends and geometries control reservoir occurrence, and this aspect of stratigraphic entrapment should be expected in future "Gray" sandstone fields in this area. Reservoir permeabilities in the "Gray" sandstones are limited because of the presence of pore-filling chlorite, illite-smectite, and dolomite.