larger isolated reefs give way southward to reef banks 5 to 8 km across, surrounded by mudstones and wackestones containing pelagic microfossils. Shallow-water deposits of the southernmost bank "step" progressively southeastward over deeper water limestones.

Reef cores in most of this belt consist of platy, branching megacolonies of the coral *Microsolena,* encrusted by thick, laminated stromatolites. In the north, rudists are abundant only on reef flanks and caps, and in shallow interreef and backreef areas. Rudists increase in abundance on reef banks to the south, as do various encrusting and head-forming algae. Thoroughly bound rudist-coral-algal frames dominate the southernmost reefs.

Lagoonal limestones of the early regressive phase overlie the reef interval, and are punctuated in the south by the thick sandstone and shale wedge. Nearshore and continental clastic units of the Cintura Formation ended carbonate deposition in this area.

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Deposition and Diagenesis of Mississippian Pinnacle Reefs of Chappel Limestone, Fort Worth Basin, Texas

The Mississippian Chappel Limestone constitutes an important oil-bearing unit that occurs along the western margin of the Fort Worth basin in north-central Texas. It has long been assumed that the Chappel is productive from pinnacle reefs. Stratigraphic relations of the "Chester," which in part overlies the Chappel, and the Chappel have remained enigmatic.

Study of cores reveals that the Chappel represents a mound-core facies consisting predominantly of fenestrate bryozoans which, soon after death, became rigidly stabilized by submarine aragonitic-fan druse cements; these provided sufficient wave resistance for the mounds to be termed "reefs." The "Chester" represents a flank facies, consisting predominantly of crinozoan components and siliceous sponge spicules, that is time-equivalent to Chappel core facies. Flank dips range up to 35°. Thus the term "pinnacle" is no longer applicable to these reef complexes.

The core facies consists predominantly of bryozoan boundstones and very coarse grainstones ("slabstones"); the flank facies contains grainstones, packstones, and wackestones. Slope instability precluded formation of submarine cements in grainstones of the flank facies.

The reef complex was subjected to complex, multicyclic diagenesis which records several episodes of subaerial exposure and freshwater diagenesis followed by submergence, recolonization, and renewed reef growth.

Nearly all preserved porosity is in the reef core and represents primary voids among erect and broken bryozoan "fronds"—voids which have been filled to varying degrees by submarine and vadose internal sediments, submarine cements, and meteoric vadose and phreatic cements. These materials were cyclically emplaced during submergent and emergent phases.

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Paleoecologic Implications of Foraminiferal Distributional Patterns Off Big Pine Key, Florida

Foraminifera are important both as biotic elements and as skeletal constituents of sediments in carbonate depositional provinces such as south Florida. A better understanding of distribution, habitats, and ecology of shallow-water Foraminifera can lead to more accurate paleoenvironmental interpretations based on the fossil record. In shallow-water carbonate environments plants are an important foraminiferal habitat, and the plant-dwelling biocoenosis in an area may not be reflected accurately by the thanatocoenosis among the associated bottom sediments.

Bottom sediments and vegetation were collected from lagoonal, tidal channel, patch reef, and outer reef environments in the vicinity of Big Pine Key. Living and dead individuals were distinguished for the 106 foram species identified. Sanders' similarity index indicated that the biocoenoses on different kinds of plants within any one environment were similar, whereas the biocoenosis from each major environment was unique. The Shannon-Wiener information function showed a correlation between species diversity and evenness as related to degree of environmental variability. Additionally, biocoenoses from vegetation were dissimilar to thanatocoenoses among sediments. Larger, more robust tests were predominant among sediments, particularly in less sheltered environments. Postmortem processes, such as sorting and differential destruction of tests, affect the character of species diversity and evenness indigenous to living populations. In making paleoecologic and paleoenvironmental analyses of fossil foraminiferal assemblages, it is necessary to discriminate between ecologic factors that influence the distribution of living populations and environmental factors that determine the final character of the dead assemblage.

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Mechanisms of Basin Subsidence

No abstract available.

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Entrapment Factors in California Turbidite and Canyon-Related Pools

California oil and gas pools in a variety of turbidite and other deep-water facies are classified according to their dominant or diagnostic causative geologic factors, some uniquely, others in more than one category. Canyon-dependent traps include sandstones in canyon walls and sandstones buttressed against canyon walls (Walnut Grove), sandstones draped by differential compaction over channel fill (Rosedale Ranch), and possibly other configurations. Fan-dependent stratigraphic traps are sand channels (and bar buildups?) without significant secondary structure (Strand). Anticline-depen-

dent traps include simple or braided sand sheets in younger anticlines (Ten Section) and more elusive narrow channel sands crossing such structures (Yowlumne). Fault-dependent pools with fault closure in fan sands include downdip block downthrown (English Colony), downdip block upthrown (Strand), possible downthrown rollover (Bellevue), and a postulated permeability barrier caused by strike-slip shearing (Coles Levee). Uplift bathymetry-dependent pools involve sands deposited against contemporary uplifted bathymetric highs, including basin-margin wedging (Saticoy), pinchouts of widespread sands against isolated uplifts (Paloma), and pinchouts of restricted channel sands against surrounding uplifts (26-R Elk Hills).

The scheme is intended to systematize model recognition in exploratory thinking rather than to generate unique pigeonholes. For example, bathymetrically restricted channel sandstones later upfolded to form traps may usefully be considered as anticline-dependent or as uplift bathymetry-dependent, and exploration for them may involve the search for channels in known anticlines (Yowlumne) or the search for anticlines along the postulated course of a channel sandstone (Asphalto).

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Uranium in Orca Basin Sediments

Removal from solution in anoxic environments is one of the major fates of dissolved uranium in the ocean. The mechanism for this phenomenon is thought to be reduction of the carbonate-complex-stabilized U^{VI} found in oxygenated waters to U^{IV}, which is subsequently adsorbed on aluminosilicates or chelated by organic ligands in the solid substrates. Enrichments up to two orders of magnitude have been reported in anoxic sediments relative to sediments deposited in oxygenated environments. However, sediments deposited in Orca Basin, a hypersaline anoxic basin which lies at a depth of from 2,200 to 2,400 m in the northern Gulf of Mexico, show no such uranium enrichment.

Samples analyzed from two piston cores taken in the deepest part of the basin show an average uranium concentration of about 2 ppm, whereas the average uranium concentration in open-marine sediments in the northern Gulf is about 3 ppm on a carbonate-free basis. However, when the samples are corrected for carbonate and salt contents, uranium values approach the average found for sediments deposited in oxic environments.

The lack of uranium enrichment in Orca Basin sediments must be due to the low amounts of uranium in the source of the brines—probably underlying salt domes from which they were dissolved. Diffusion of dissolved uranium from the overlying sea water must be negligible also.

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Computation of Initial Well Productivities in Eolian Sandstone on Basis of Geologic Model, Leman Gas Field, United Kingdom

Realistic well-productivity calculations based on geologic models are an important aid in predicting field performance. For the Leman field in the North Sea, such models have been used to predict production potentials of untested wells and to judge the danger of water coning.

The Leman field reservoir rock in the Permian Rotliegendes Sandstone is 180 to 270 m thick. The major producing unit is composed of giant eolian cross-bed sets with an average thickness of 4.5 m. The orientation of the foreset-lamina dip is remarkably uniform. The variation of the bottomset zones underlying the spoon-shaped cross-bed sets caused a very heterogeneous permeability distribution. The heterogeneity is enhanced by variations in clay content and diagenesis.

No data were available on the length/width/thickness ratio of giant eolian cross-bed sets formed by transverse dunes. Outcrop studies in the Canyon de Chelly (Arizona) have been carried out to gather information on the geometry of this type of cross-bed sets. The large horizontal extent of the cross-bed sets (length approximately 200 times the thickness), combined with the low permeability of the associated bottomsets, indicates that water coning will be minimal. Initial well behavior is probably controlled by the properties of the thickest, more permeable cross-bed sets.

Furthermore, some pairs of wells may be interconnected via continuous, fairly permeable beds because the average well spacing is less than the average cross-bed set length (900 m). Log correlations tend to confirm this conclusion.

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Deformation of Continental Slope Sediments Resulting from Large-Scale Downslope Creep

Recently acquired high-resolution seismic data suggest that a previously undescribed style of deformation may be common in sediments on the continental slope. This deformation is characterized by folds whose axes are oriented roughly parallel with the slope of the seafloor (perpendicular to isobaths). In cross section, the amplitude and wavelength of folds range from 5 to 50 ft (1.5 to 15 m) and from 300 to 2,000 ft (100 to 600 m) respectively. The amplitude generally decreases with depth, and undeformed sediments form the base of the folded sequence. Folded sequences up to 400 ft (120 m) thick have been observed on the continental slope offshore Louisiana. Where not buried beneath younger, undeformed sediments, these folds are expressed at the seafloor as a series of ridges and furrows which are mappable using side-scan sonar. Detailed mapping has shown that individual folds are several hundred to several thousand feet long and the areal extent of folding is tens of square miles. Where the continental slope is irregular, fold axes converge downslope into bathymetric lows forming a fanlike pattern. Folds are rare or absent where the continental slope is planar and on the crest of bathymetric highs.

This style of deformation has been detected in sediments consisting primarily of cohesive clays on the upper continental slope off Louisiana, Texas, and California where seafloor slopes range from 2 to 15%. It is