The Louisiana chenier system is the product of a complex interaction of coastal, riverine, biologic, and storm processes. An important component of the chenier system, the chenier ridge, has been described as an accumulation of sand and/or shell material winnowed from existing marsh and tidal flat deposits. According to most interpretations, these ridges are correlative with changes in the flow direction of the Mississippi River from west to east. Most workers believe that the extensive mudflat and marsh sediments that separate the chenier ridges represent periods of progradation, influenced by a high sediment load from the Mississippi during periods of westerly discharge. These alternating periods of easterly and westerly flows represent the classical model that has been presented for genesis of the chenier plain during the past 3,000 years.

While it is generally agreed that Mississippi River sedimentation has been a major factor in the development of coastal geomorphology of southwestern Louisiana, the "flip/flop" model presented above is oversimplified. Furthermore, the term, chenier ridge, has been indiscriminately applied to almost any morphologic unit within the system that shows noticeable relief as reflected in vegetative development. Therefore, little genetic significance should be ascribed to the term. Multiple beach ridges, recurved spits, overwash deposits, storm berms, strandline ridges, perched beaches, and ancient oyster reefs all quality as chenier ridges under previous guidelines.

A more serious problem that appears with the Mississippi River flip/flop model is that relict shoreline dates are not directly correlative with the Mississippi delta-lobe dates, and a growth rate curve of the chenier plain does not support this model.

If the modern southwestern Louisiana coastal zone is examined, several distinctly different environments are encountered: shelly sand beaches, exposed tidal mudflats, and eroding marsh deposits. The conceptual model that has been implied in previous studies of a strandline consisting either of chenier ridges or a marsh/tidal flat environment, depending on the Mississippi River discharge direction, appears to be unjustified on the basis of modern day conditions and C^{14} dating. Refinements in the model based on current field work and further dating should yield a more detailed and integrated picture of the development of the chenier system through time.

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Jurassic Geology and Hydrocarbon Potential of Southwestern Alabama

The Jurassic Haynesville-Buckner-Smackover-Norphlet sequence in southwestern Alabama includes excellent deep reservoirs and laterally equivalent source rocks. The complex interaction of stratigraphy, syndepositional salt tectonics and faulting, and draping due to differential compaction over basement structures provides mechanisms for early entrapment of potentially significant hydrocarbon reserves in this area. Major Smackover-Norphlet production to the northwest and northeast, at Hatters Pond, Chunchula, and Jay fields, is from facies similar to those found in southwestern Baldwin County, Alabama. Detailed petrographic analyses of cores, chips, and cuttings samples from seven wells in southern Alabama and western Florida provide data for conceptualizing Upper Jurassic stratigraphy (Norphlet-Lower Haynesville) and paleofacies relations in this area.

The development of a regional Triassic Eagle Mills paleotopography in this area, including the interior salt basin, was influenced by existing Paleozoic basement structural trends and tensional tectonism related to incipient opening of the ancestral Gulf of Mexico. In the easternmost part of the salt basin, deposition of the Werner Anhydrite and Louann Salt was succeeded by the southward progradation of fluvial lower Norphlet facies. Upper Norphlet facies include littoral and possibly eolian sandstones, which are among the oldest Jurassic hydrocarbon reservoirs in the region. Rapid inundation of the Norphlet surface in lower Smackover time resulted in the deposition of "basinal" argillaceous carbonates (brown dense facies) in the area. This event was followed by the establishment and progressive southward progradation of a shoal-water limestone facies mosaic, including high-energy grainstones. Many of these subsequently dolomitized grainstones have porosities of as much as 24% and good permeabilities despite their burial below 19,000 ft (5,791 m) in southern Baldwin County. However, commercial hydrocarbon production from such reservoirs has not yet been extended south into this area.

Evaporitic sabkha facies of the uppermost Smackover and Buckner-Lower Haynesville subsequently prograded over shelf carbonates throughout most of the study area. Whereas the area south of the Baldwin County graben generally appears to have remained basinal in character throughout all of Smackover time, Buckner-Lower Haynesville deposits in the Amoco 2 Amos well in Sec. 32, T7S, R4E, include thick grainstone shoal deposits which indicate the local existence of an emerging positive area south of the graben. This facies could provide for a significant stratigraphic-structural hydrocarbon accumulations in this heretofore unexplored region.

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Early Cementation and Mineral Stability of Chipola Formation, Calhoun County, Florida

The Chipola Formation crops out along the Chipola River, Ten Mile Creek, and Farley Creek in Calhoun County, Florida. The formation, dated at 16.1 m.y.B.P., is predominantly an unconsolidated, bioclastic wackestone. These carbonate rocks have undergone very little diagenetic alteration and as a result, fossil preservation is excellent. Original mineralogy is unchanged. X-ray analysis of unlithified sediment indicates an average composition of approximately 70% carbonate (45% aragonite and 25% low-magnesium calcite) and 30% noncarbonate (15% quartz, 6% clay, and 9% other). Most shell material is preserved as aragonite and a few sediment samples are still composed of high-magnesium calcite. Disregarding the age of the formation, the unit is considered to be in a very early diagenetic stage.

Cementation occurs in the unit by the formation of low-magnesium calcite in the form of microspar. The lithified patches of the formation take on a nodular appearance as bioclastic debris is cemented. Cementation by microspar and bladed pseudospar occurs in burrows, shells, and as random nodules. Microspar is typically equant and uniform with an average crystal diameter of 14 μm. Microspar formation results in an increased crystal volume characterized by exploded shells and extruded matrix. The crystal formation is an early diagenetic phenomena and probably driven by the presence of organic matter.

In addition to microspar, aragonitic shells are commonly replaced by neomorphic sparry calcite. Replacement appears to occur along an advancing front and is probably a result of thin-film reactions. There is no crystal volume increase.

Neomorphic spar (often referred to as "pseudospar") is formed by a different process than microspar (pseudospar) and the final diagenetic effects are different. Distinction should be made between types of pseudospar, and the terminology clarified.

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Should We Permit Mississippi-Atchafalaya Diversion?

About one and a half billion dollars is planned for the relocation of control structures, upgrading guide levees, and developing the Atchafalaya basin as a wetlands resource in the coming decade. What would be the engineering, cultural, environmental, and economic consequences should the Mississippi River be diverted through its Atchafalaya distributary? Perhaps the answer is that the future of southern and coastal Louisiana would be better served if the river were not shackled with artificial and costly engineering restraints and were permitted to choose the shorter, natural path to the sea. This paper proposes an in-depth comparison of situations which: (a) maintain the status quo, (b) consider the effects of a gradual, planned increase in the rate of diversion, and (c) consider the effects of a rapid, uncontrolled diversion during an immense flood or series of floods.

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Modern Lagoonal Ostracodes and Species Diversity Gradients, Gulf of Mexico

Observed species diversity trends have been explained by the time-stability model of Slobodkin and Sanders. Their model predicts low rates of speciation from equable into hostile environments. Species radiation from tropical, unstressed (equable) environments into higher latitude stressed (unequable) zones should be relatively slow. Speciation from hostile (stressed) to equable (unstressed) biotopes should occur faster. These differences in rate will theoretically result in lower species diversity in hostile regions. This model is tested with ostracode population data collected from two modern lagoons in the Gulf of Mexico: Laguna Mandinga, Veracruz, Mexico (19°04′N lat., 96°04′W long.), lies south of the Tropic of Cancer, and is a small (20.39 sq mi or 53 sq km) tidal lagoon indenting the coastal plain of Mexico about 5 mi (8 km) southeast of the port of Veracruz; and Bay St. Louis, Mississippi (30°20′N lat., 89°20′W long.), is a shallow bay of slightly smaller area (16.52 sq mi or 43 sq km) about 13 mi (21 km) southwest of Gulfport. These two brackish-water bodies are separated by 11°16′ lat. ($\sim$ 716 mi or 1,146 km) and 6°44′ long. ($\sim$ 422 mi or 675 km). Both water bodies have been quantitatively sampled for benthic ostracodes. Total (live + dead) populations from 35 sample stations in Laguna Mandinga and 23 stations in Bay St. Louis ($\sum = 58$) furnish data which provide an estimate of latitudinal diversity gradients between these two depositional environments. Diversity measures calculated for each water body include S (number of species), H(S) (Shannon-Wiener function), and E (equitability). Calculations show that average S values in Mandinga (5.171) are higher than those in Bay St. Louis (2.870). Average H(S) values in Mandinga (1.214) are also higher than in the Bay (0.633). Average E values in Mandinga (0.673) are lower than those in the Bay (0.842). These diversity values indicate ostracode species are more prolific in Gulf of Mexico tropical lagoons; they demonstrate lesser species dominance in tropical Mexican lagoons; and they show less species equitability in the tropical environments. Temperate bays in the northern Gulf apparently support fewer ostracode species, show stronger species dominance, and are more equable in species distribution. These data support the time-stability hypothesis, and suggest the tropical Mexican ostracode fauna is slightly older, hence more diverse than the temperate northern Gulf fauna.

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Environmental and Diagenetic Controls of Carbonate and Evaporite Source Rocks

The organic geochemistry of shale source rocks has been a subject for extensive research during the past two decades. Many useful interpretive techniques have been developed for the assessment of hydrocarbon potential of sedimentary basins in which shales are the principal and logical source for petroleum generation. Nevertheless, the present understanding of carbonate and evaporite source rocks remains superficial. The criteria generally employed to assess shale source rocks are inadequate and misleading when applied to carbonate-evaporite basins.

Most misconceptions regarding the hydrocarbon potential of carbonate and evaporite rocks stem from a simplistic notion that organic matter associated with the sediments on well-aerated carbonate shelves and evaporite-depositing environments is not likely to be preserved. Recent data on organic geochemistry of Holocene carbonates from shallow shelves suggest that (a) organic matter can be preserved in certain environments; and (b) the kerogens produced from degradation of organic matter in carbonate sediments are predominantly sapropelic and therefore much more efficient sources for hydrocarbons than the mixed humic-sapropelic kerogens of shales.

The preservation of organic matter in carbonates and evaporites is controlled primarily by environments of deposition and the diagenetic overprints. Sabkha, lagoonal and basinal environments, for example, are excellent for organic-matter preservation; vadose and