cene stand of sea level at 120–140 ft altitude, an Aftonian stand at 90–100 ft, a Yarmouthian stand at 40–70 ft, and a Sangamonian stand at about 25 ft.

The classic exposures of the Fort Thompson and Caloosahatchee Formations on the Caloosahatchee River are the best sections for correlation. Cooke's four marine units in the Plio-Pleistocene sequence are confirmed by detailed tracing of fossiliferous beds, fresh-water marl, and caliche crust related to unconformities. Faunas in the four marine beds show distinct biostratigraphic and paleoecological trends. The ratio of extinct to extant molluscan species indicates a Pliocene age for unit 1 (the lowest marine bed). The presence of Pleistocene land vertebrate remains and the ratio of extinct to extant molluscan species indicate a Pleistocene age for units 2, 3, and 4. For mapping purposes, the lower two units, 1 and 2, are included in the Caloosahatchee Formation. Units 3 and 4 are included in the Fort Thompson Formation. The following bathymetric interpretations were made on the basis of molluscan and foraminiferal faunal assemblages: unit 1—maximum depth 15–20 fm; unit 2—maximum depth 10–15 fm; unit 3—maximum depth 5–10 fm; and unit 4—less than 5 fm.

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SHALE DIAPIRS OF LOWER TEXAS GULF COAST AS TYPIFIED BY NORTH LAWARD DIAPIR

Most geologists who have worked the Oligocene-Frio trend of the Gulf Coast have encountered shale or salt diapirs in their subsurface mapping. Much has been written about salt diapirs or salt domes but little emphasis has been placed on pure shale diapirs.

The purposes of this paper are to acquaint the reader with a typical example of a shale diapir and to point out the possible economic and geologic significance of these features in future exploration for buried lower Frio structures. The North LaWard diapir was chosen because of the large number of wells drilled into the shale stock. This shale diapir has intruded into the lower Frio to a depth approximately 1,100 ft above the base of the Frio Formation. The intrusion appears to have taken place as late as late Frio time and most of the lower Frio reservoirs have been truncated and displaced by the shale. Shale diapirs that have not intruded the lower Frio are believed to have formed many of the lower Frio buried structures such as Una West, Potilla, and Copano fields.

The timing and extent of intrusion by the diapiric shale seem to be critical factors in determining the economic success or failure on these structures.

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WORLD-WIDE EXPLORATION EFFORT AND ITS EFFECT ON GULF COAST GEOLOGIST

(No abstract submitted)

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PALEOCLIMATIC SIGNIFICANCE OF BRYOZOAN METRARABDOTOS

The cheilostome bryozoan genus *Metrarabdotos* occurs abundantly in late Eocene to Recent sediments in the Gulf and Atlantic coastal provinces, the Caribbean region, Europe, and northern and western Africa. The tropical distribution of Recent populations is apparently a consequence of a temperature tolerance of 61° to 82°F. This stenothermy and the distinctive generic morphology of fossil and Recent species provide a basis for identifying tropical faunal provinces on the sublittoral margins of both sides of the Atlantic during late Paleogene and Neogene times.

The northern limit of the genus, congruent in Recent seas with the 70°F. isocryme for surface water, has fluctuated during late Paleogene and Neogene times. The amplitude of latitudinal fluctuation has been 8° in the New World and 34° in Eurafrica. The synchronous latitudinal shifts of this line on both sides of the Atlantic probably reflect variations in Atlantic marine climate. The northern boundary of the genus lay at 31° N. Lat. in the Gulf and Atlantic Coastal Plain and at 40°–48° N. Lat. in Europe from late Paleogene to middle Miocene, at about 26° in America and 28° in Europe in late Miocene, and at its northern maximum of 34° in America and 51° in Europe in the Pliocene; it now lies at 29° in the Gulf of Mexico and at 17° in Africa. The greater amplitude in Eurafrica is probably the result of a surface-current gyre similar to the modern one. The pattern of increasing amplitude of fluctuation does not agree with a paleo-climatic model of cooling from early to late Tertiary time.

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DIAPIRS IN SOUTHWESTERN GULF OF MEXICO

Recent surveys have traced the belt of diapiric structures, first observed in the Sigsbee deep, through the Bay of Campeche to within about 60 mi of the saline basin of southeastern Mexico. This prompts a further examination of the structure of the Gulf of Mexico with particular attention to the possibilities that the diapirs are salt.

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DEPOSITIONAL SYSTEMS IN WILCOX GROUP OF TEXAS AND THEIR RELATIONSHIP TO OIL AND GAS OCCURRENCE

Regional investigation of the lower part of the Wilcox Group in Texas in outcrop and subsurface indicates seven principal depositional systems. These include: (1) Mt. Pleasant fluvial system developed updip and in outcrop north of the Colorado River; (2) Rockdale delta system, present primarily subsurface between the Guadalupe and Sabine River; (3) Pendleton lagoon-bay system in outcrop and subsurface largely on the southern flank of the Sabine uplift; (4) San Marcos strandplain-bay system, found in outcrop and subsurface mainly on the San Marcos arch; (5) Cotulla barrier bar system in subsurface of South Texas; (6) Indio bay-lagoon system developed updip and in outcrop of South Texas; and (7) South Texas shelf system, an extensive system entirely subsurface in South Texas. The Rockdale delta system, consisting of large lobate wedges of mud, sand, and carbonaceous deposits, is the thickest and most extensive of the lower Wilcox depositional systems. It grades updip to the thinner terrigenous facies of the Mt. Pleasant fluvial system Deposits of the Rockdale delta system were the source of sediments redistributed by marine processes and deposited in laterally adjacent marine systems. Delineation of depositional systems and, more specifically, delineation of component facies of the various systems, permit establishment of regional oil and gas trends which show relationship to