No. 1, Lirette Field, Terrebonne Parish, Louisiana

The Humble Oil and Refining Company, H. J. Ellender No. 1, sec. 32, T. 19 S., R. 19 E., Lirette field, Terrebonne Parish, Louisiana, is the type locality for *Bigenerina nodosaria directa*, *Cibicides carstensi*, *Uvigerina lirettensis*, *Globorotalia fohsi fohsi*, and *Globorotalia mayeri*, stratigraphically important Miocene marker species described by Cushman and Ellisor (1939). *Globorotalia fohsi fohsi*, ranging from the *Cibicides carstensi opima* zone upward through the *Bigenerina humblei* zone, has been used extensively for intercontinental correlation of Miocene deposits.

Ellisor (1940) reported *Bigenerina humblei*, *Uvigerina lirettensis*, and *Globorotalia fohsi fohsi* at 9,612 feet, the sample depth from which she and Cushman had earlier described *Globorotalia fohsi fohsi* and *Globorotalia mayeri*. Additional deeper drilling and later work has proved that the Humble Ellender No. 1 well penetrated sediments no older than *Bigenerina nodosaria directa-Cibicides carstensi* and that the deepest well in Lirette field, the Humble H. J. Ellender No. 6 (also located in sec. 32), drilled to 13,500 feet, did not encounter the *Textularia stapperi* zone which overlies the *Bigenerina humblei* zone.

In order to establish that *Bigenerina humblei* could not have occurred at 9,612 feet in Lirette field, and that the Humble Ellender No. 1 well should not be considered a valid type locality for *Globorotalia fohsi fohsi* and *Globorotalia mayeri*, two cross sections have been constructed; A-A′ from Raceland field, Lafourche Parish, to Bay Baptiste field, Terrebonne Parish, and B-B′ from Patterson field, St. Mary Parish, to Lirette field. The two sections depict the general downdip (coastward) thickening of the Miocene section and the tremendous sedimentary accumulations encountered on the downthrown sides of the large "growth" or depositional faults typical of the area.

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Robulus "43" and *Discorbis* "4"—Two Useful Miocene Foraminifera in Louisiana

For a number of years a foraminiferal species, commonly designated *Robulus* "43" by economic paleontologists, has been used to mark a biostratigraphic zone in the Miocene post-Anahuac sedimentary sequence of south Louisiana. In the petroleum industry this species has also been known as *Robulus* "L," *Robulus* "4," and *Cristellaria* "angular." A paper describing and naming this species and its associate *Discorbis* "4" has been submitted to the Journal of Paleontology for publication (Butler, in press).

Regionally, the *Robulus* "43" zone lies stratigraphically below the *Cibicides carstensi opima* and *Amphistegina* "B" zones and above the *Operculinoides* sp. zone. The *Amphestegina* "B" fauna generally occurs 100 to 200 feet above the *Robulus* "43" zone, but tends to climb stratigraphically in the section along strike and to the southwest. Since *Robulus* "43" shows less stratigraphic variation than the *Amphistegina* "B" fauna, it is considered a more reliable regional marker on which to base correlations.

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Foraminiferal Populations and Faunas in the Barrier Reef and Lagoon of British Honduras

Eighty-nine sediment and 41 bottom-water samples were collected from the barrier reef and lagoon of British Honduras. The sediment samples were obtained with a gravity coring tube and a Van Veen grab sampler. The top 1 cm. or 10 ml. of wet sediment of each core or grab sample was used to study the contained Foraminifera. The temperature and salinity of each bottom-water sample were measured.

Living and total (living and dead) foraminiferal populations were determined in each sediment sample. The largest populations on the barrier reef occur on the leeward side of mangrove and coral sand cays.

The Barrier Reef fauna was typified by the restricted occurrence of some species of the families Alveolinellidae, Amphisteginidae, Cymbaloporidae, Peneroplidae, and Rotaliidae, and abundant and diversified Miliolidae.

The Lagoon fauna was characterized by the abundant occurrence of species of *Elphidium* and *Nonian*, and the relatively common occurrence of variants of *Streblus beccarii*.

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Paleoecology of the Choctawhatchee Deposits at Jackson Bluff, Florida

The Choctawhatchee (late Miocene) deposits exposed at Jackson Bluff, on the Ochlockonee River, are composed of two fossiliferous units separated by a slight erosional disconformity.

Comparison of fossil molluscan and foraminiferal assemblages with extant communities in the Gulf of Mexico, western Atlantic, and Caribbean indicates that the Choctawhatchee sediments were deposited in an open-marine near-shore shallow to intermediate shelf zone, at depths of less than 21 fathoms.

The lower part of the lower unit ("*Ecphora* facies") is transgressive over the nonmarine Hawthorne (medial Miocene?), and the deposits representing maximum water depth for the section lie a few feet above the base of this unit. The upper part of the lower unit was deposited under shoaling conditions. The overlying unit ("*Cancellaria* facies") is transgressive, but was deposited at a depth of less than 8 fathoms.

The terms "*Ecphora* facies" and "*Cancellaria* facies" as applied to this section, are rejected.

Comparison of the Jackson Bluff Choctawhatchee deposits with those at Alum Bluff, Liberty County, Florida, indicates that the lower unit at Jackson Bluff is contemporaneous with Units 2 and 3 ("*Ecphora* shell bed") and Unit 4 (Aluminous clay) at Alum Bluff, and that the upper unit at Jackson Bluff is contemporaneous with the upper Choctawhatchee sand (Unit 5) at Alum Bluff.

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Biostratigraphy of South-Central Lafourche Parish, Louisiana

A biostratigraphic study of south-central Lafourche Parish, Louisiana, was undertaken to solve some of the structural and stratigraphic problems of the area. Samples from wells in Valentine, Bully Camp, Golden Meadow, Leeville, and Bayou Raphael fields in Lafourche Parish were examined paleontologically. Samples from one well in Bayou Jean LaCroix field in eastern Terrebonne Parish were examined. Results of these paleontological examinations served as the principal source of regional correlations; electrical logs were also used at key locations when samples were not available, or were not collected from high enough in a well for the uppermost occurrence of index forms to be observed.

A restored stratigraphic dip section illustrating downdip thickening, and a stratigraphic strike section demonstrating the essentially horizontal nature of the beds, were constructed. A structural cross section through the Golden Meadow field illustrates a graben and fault pattern typically associated with a deep-seated salt mass.

As defined in this study, the "*Eggerella* wedge" and the "second" *Cibicides carstensi* zone are useful horizons south of a zone of flexure found between the west flank of the Golden Meadow field and the south flank of the Bully Camp field. This zone of flexure may be traced downdip. Sediments above the trace are "plate-like" continental shelf deposits and are easily correlated; those below the trace are continental slope deposits and extremely difficult to correlate because of the great thickening and gross lithologic changes which take place in this zone.

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PALYNOLOGY OF THE MIDWAY-WILCOX BOUNDARY IN SOUTH-CENTRAL ARKANSAS

In south-central Arkansas, sediments of the lower Eocene Wilcox group rest on the eroded upper surface of the Porters Creek Clay of Paleocene age. An investigation of the palynomorphs present in these stratigraphic units disclosed a sharp change in spores, pollen and dinoflagellates across the Midway-Wilcox boundary.

The most abundant pollen in the Porters Creek Clay is a *Taxodium*-like form. Triporate pollen and psilate, monolete spores are also common. *Aquilapollenites* and *Classopollis*, genera common in Cretaceous rocks, are also present in the Porters Creek Clay. Dinoflagellates are abundant, but hysterichosphaerids are rare. A varied palynomorph assemblage is present in the Wilcox sediments of the area. Tricolporate pollen, a type rare in the Porters Creek Clay, is the most abundant form. The Wilcox pollen flora has a more modern aspect than that of the Porters Creek Clay. *Aquilapollenites* and *Classopollis* have not been found. Dinoflagellates and hystrichosphaerids are rare in the Wilcox sediments.

The sharp change in palynomorphs across the Midway-Wilcox boundary in this area apparently reflects both evolutionary changes in Tertiary floras and changes in the nature of the environment.

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SOME "MARKER" FORAMINIFERIDA FROM THE MIOCENE OF SOUTHEAST LOUISIANA

Effecting reliable regional correlations in the complex stratigraphic sequence of southeast Louisiana requires the recognition of index species of Foraminiferida. The use of such "marker" fossils in subsurface correlations is illustrated in a paper by the junior author, "Biostratigraphy of South-Central Lafourche Parish, Louisiana," which appears in the G.C.A.G.S. volume.

Foraminiferida representing thirty-four species-groups from twenty-five genera are illustrated and discussed. Six of these forms have not been reported previously from the Miocene sediments of this area. Two new taxonomic combinations, *Pseudonodosaria comatula* (Cushman) and *Lenticulina* (*Robulus*) *lacerta* Garrett, appear here for the first time, in conformity with recent generic revisions in the nodosarine Foraminiferida.

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CURRENT STATUS OF THE UPPER EOCENE FORAMINIFERAL GUIDE FOSSIL, *Cribrohantkenina*

All the known species of the genus *Cribrohantkenina* have been refigured. The genus *Cribrohantkenina* is monotypic with *Hantkenina inflata* Howe, 1928, the type species. *Hantkenina mccordi* Howe and Wallace, 1932; *Hantkenina danvillensis* Howe and Wallace, 1934; and *Hantkenina* (*Cribrohantkenina*) *bermudezi* Thalman, 1942; are junior synonyms. The genus is confined to the upper Eocene (Priabonian) and is an important, world-wide, index fossil.

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FALLING-WATER-LEVEL RIPPLE MARKS

Ripple marks produced in shallow water, especially when the water level is falling, are more varied, more complex, more easily interpreted, and more valuable in paleogeographic studies than ripple marks developed under other conditions. Shallow-water and falling-water-level ripple marks are conveniently studied on sand-floored tidal flats as well as in wave tanks. Tidal flats have the advantage that a variety of wave systems, moving from different directions, can be studied, both singly and in combination.

Flat-topped ripple marks, in many different patterns, are formed when the water level drops to, or below, the ripple-mark crests. When the rate of water level fall varies systematically, terraced flat-topped ripple marks are produced. Two parallel ripple-mark systems, having smaller ridges centered in the troughs between larger ridges, developed as a result of the adjustment of wave orbit diameters during the fall.

Helical cell ridges ("rib-and-furrow"), windrow ridges and other long down-current ridges are produced primarily by direct current flow, or by a vector combination of waves and currents, in shallow water. Composite ripple marks arise when the motions of two in-phase wave systems are added vectorially. Out-of-phase combination yields a wavy map pattern. Additional ripple-mark types found on the tidal flat or in very shallow water have sharply pointed troughs and gently rounded crests, or are flat-bottomed despite an abundance of sand. These types may be caused by a combination of wave action and mass flow of shallow water.

The catalog given here does not exhaust the list. New varieties are being found with some regularity. Many of these varieties have been observed in the lithified rock column, and can be interpreted with relatively great confidence.

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SEASONAL ECOLOGICAL STUDY OF FORAMINIFERA FROM TIMBALIER BAY, LOUISIANA

Within the last decade, considerable attention has been directed toward understanding the ecological habits of Foraminifera. This study has ventured deeper than previous ones in an attempt to learn the habits of living Foraminifera in Timbalier Bay, Louisiana, over a period of a year.

Ten monthly collections of samples were made from seventeen locations in the bay. Data relating to salinity, temperature, pH, eh, and other chemical and physical properties of the waters were recorded at this time.

Upon examination of the samples, it was determined that twenty-three species of Foraminifera could be con-