ervoir recovery efficiency, (4) entrapment history and area of accumulation, (5) functional reservoir thicknesses, and (6) the individual and group credibility of assigned values.

A precise combination of these parameters would establish an *in situ* reserve of hydrocarbons and its worth. Computers can minimize effectively the options for the involved disciplines excepting geology. The assignment of probabilities and values to multiple working geologic hypotheses continues to govern the assumed reserve and competitive bid. Expansion of measurement capability is probable, and its increased definition power will accentuate the role of conceptual geology.

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BLACK WARRIOR BASIN

The Black Warrior basin of Mississippi and Alabama is a potentially large oil and gas province with numerous possible reservoir units. This study excludes the rocks of the Ouachita folded belt in central Mississippi.

All the Paleozoic systems except the Permian are present in the study area and only the Cambrian does not crop out on the surface. There are at least 77,725 cu mi of sedimentary rocks, predominantly carbonates, in the basin.

Oil and gas have been, or presently are, produced from the Cambro-Ordovician, Ordovician, Mississippian, and Pennsylvanian in the Black Warrior basin. Analysis of the depositional and structural configuration of the area shows new trends that offer tremendous potential for a future major oil and gas province. The basin is considered a part of the Appalachian geosyncline. For each system present an attempt has been made to reproduce the tectonics affecting deposition and to depict the rocks as originally deposited. In this manner trends of high-energy deposition can be postulated, shorelines can be reconstructed and potential stratigraphic traps delineated. When these relations are analyzed, the known oil and gas shows in the Black Warrior basin become very significant.

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EAST BAY, MISSISSIPPI RIVER DELTA

Walsh discovered a quasi-permanent upwelling zone in East Bay, between South Pass and Southwest Pass of the Mississippi delta. He applied remote sensing to the study of physical characteristics of the sea surface around the delta. The purpose of cruise 68-A-14 of the R/V *Alaminos* was to verify Walsh's findings and to see if they were reflected in the bottom sediment.

In spite of a norther (cold front) coming over during the first days of the cruise and mixing the water body to a certain degree, the presence of cells with higher surface salinity and temperature than the surrounding water was substantiated. The bottom sediment distribution pattern shows an oval area underneath the salinity-temperature cells which is more silty than the surrounding sediments. Cores reveal that the cells were present during the accumulation of at least 7 m of sediment, indicating that the phenomenon is natural and not caused by warm brines released by the activities of the oil industry in this area.

Bathymetry analyses show a large variation in small topographic features and fewer gullies than indicated by Shepard a decade earlier. Comparing his and the present results, a trend of shallowing of East Bay seems to continue, but at a rather low rate.

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PRELIMINARY SCANNING ELECTRON MICROSCOPE OBSERVATIONS ON *Orbitolina* FROM LOWER CRETACEOUS GLEN ROSE FORMATION, TEXAS

The foram *Orbitolina* occurs profusely on the outcrop. The fossils vary in size and shape, probably depending on whether they are either microspheric or megalospheric in their initial stage. Their internal structure as well as external features are being studied. Heretofore, only the specimens with a megalospheric initial stage have been studied in detail. For this purpose, many specimens have been etched with dilute hydrochloric and acetic acids, and the results have been quite satisfactory except for the extreme outer marginal zone of the test.

Orbitolina, besides the embryonic apparatus, has a very complex and delicate internal structure. This structure is divided into 3 zones: the central complex, the radial, and the marginal. Preliminary observations were concentrated on the radial zone in general, and on the marginal zone in particular, as these are present in all specimens and play an important role in the test.

The radial and marginal zones consist of chambers, and the chamber passages with connecting tubes, called stolons, cover and encircle the entire test in successive offsetting layers. This pattern is striking and beautifully delicate. The chamber walls, as well as the chamber passages and their stolons, apparently have been strengthened by the cementation of calcite crystals, as evidenced by the holes left after etching. Between the chambers, chamber passages and stolons, the living *Orbitolina* may have filled the space with crystals and foreign material of different sizes. The finest crystals were observed in the outermost part of the marginal zone and the coarser seem to have been confined to the chambers and chamber passages.

Many specimens were etched to obtain the chamber, chamberlets, and cellules of the marginal zone. Only 1 specimen was successfully etched, yielding several chambers with chamberlets and cellules. After the crystals between the chamberlets and cellules were dissolved by acid, voids or empty spaces remained. These, when observed with transmitted light, appeared to be the features previously described as "partitions" and/or "plates" in axial and horizontal thin sections of *Orbitolina.*

Without the aid of the scanning microscope, some minute details within *Orbitolina* either would not have been known, at least to the writer, or would have been difficult to interpret using only the stereoscopic microscope. These observations, and others to be made in the near future, will contribute toward making the morphology of *Orbitolina* more readily understood.

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GRAND ISLE BARRIER ISLAND, LOUISIANA—HUMAN ACTIVITY IN NATURAL DYNAMIC SYSTEM

Grand Isle, Louisiana, is a recently formed barrier