fluence on deposition became minor. The upper Frio and overlying beds dip normally southeastward toward the Gulf of Mexico. The crests of structural closures within the miniature basins shift with depth due to the rather abrupt changes in the thickness of the middle and lower Frio sections.

7. REVIEW OF HITCHCOCK FIELD, GALVESTON COUNTY, TEXAS, Jesse O. Reiter, c/o Hershal C. Ferguson, Houston, Texas.

The stratigraphy and structure of Hitchcock field, located about 40 miles southeast of Houston, are discussed in light of the 27 wells drilled there since Halbouty and Simmons' original study in 1941. The producing structure appears to be an east-west anticline, the crest of which has been down-faulted to form a graben. Maximum stratigraphic throw of the faults in the field is 280 feet. The large regional strike fault that passes north of the field has a stratigraphic throw of 830 feet. The greatest structural growth seems to have occurred during late Miocene or early Pliocene time.

The sand in which oil was first discovered (5,100-foot sand) is still the most important reservoir in the field. It is absent over the crest of the anticline, but is present on the west, south, and east flanks.

Cumulative production from Hitchcock field through 1957 was 4,115,421 barrels of oil, 1,889 barrels of condensate, and 1,180,919 MCF of gas. All of the oil and most of the gas come from the Miocene. Some gas is produced from the Pliocene. Three wells drilled to the Oligocene Frio sands failed to find production in that section.

8. TURTLE BAY FIELD, CHAMBERS COUNTY, TEXAS, R. P. Akkerman, Gulf Oil Corporation, retired.

Turtle Bay field, about 40 miles due east of Houston, produces oil and gas from upper Frio and *Marginulina* sands (Oligocene). Structurally, the field is an anticline formed not by uplift but by subsidence of its north flank into rim synclines around the Moss Bluff, Lost Lake, and Hankamer salt domes, plus regional tilting toward the southeast. The area of the field remained stable as the southerly regional dip was reversed by subsidence into the rim synclines on the north. A thicker than normal *Heterostegina* limestone is observed on the electric logs of wells drilled in the area, showing reversal of regional dip, and may be used as a criterion to localize the search for more such fields in the district.

9. *Heterostegina* REEF ON PIERCEMENT SALT DOMES, WITH SPECIAL REFERENCE TO NASH AND OTHERS IN NORTHWESTERN BRAZORIA COUNTY, TEXAS, Ralph B. Cantrell, J. C. Montgomery, and A. E. Woodard, Houston, Texas.

Reef limestone as much as 300 feet thick occurs in the *Heterostegina* zone in part of northwestern Brazoria County about 40 miles south-southwest of Houston, between Damon Mound, Nash, and West Columbia piercement salt domes. This locally developed limestone is completely surrounded by normal *Heterostegina* calcareous shale or shale with one or more very thin limestone beds.

At Nash dome the upper part of the limestone is porous, consisting chiefly of "honeycomb" corals, and the lower part is more dense. Indications are that the *Heterostegina* reef developed in a near-shore, shallow-water environment, and that its growth did not stop at the end of Anahuac time but continued even into the early Miocene.

Large-diameter conventional cores are recommended for evaluating the production potential of the *Heterostegina* limestone. Although the best porosity is found in the top of the limestone, it may develop also in other intervals. The limestone production at Nash field does not have a common oil-water contact.

Substantial oil production has been obtained from the *Heterostegina* limestone and more may be expected at Nash, Damon Mound, and West Columbia fields, at depths ranging from approximately 2,000 feet at Damon to 4,350 feet at Nash.

10. LOG INTERPRETATION IN BRACKISH-WATER FRIO TREND, Terry Walker, Welex, Inc., Houston, Texas.

The interpretation of logs in the Frio trend of the Texas Gulf Coast is complicated by thin sands laminated with numerous shale and dense streaks. Such conditions require measurements of Rxo and porosity over very short vertical intervals. Coupled with the higher-resistivity formation water, these conditions, however, offer the ideal application for the FoRxo-Guard combination in that fluid content can be resolved in stringers as thin as 1½ feet. The combination of logs offers rapid formation fluid determination in addition to reliable saturation and porosity calculations.

Correlation between the Guard Log and conventional logs in the area can be made without difficulty. In addition, correlations between Guard Logs from well to well are such that stratigraphic changes can be located closely.

11. STRUCTURE OF KARNES COUNTY AREA, TEXAS, AND ITS RELATION TO JACKSON SEDIMENTATION, D. Hoye Eargle, United States Geological Survey, Austin, Texas.

12. EROSIONAL CHANNEL IN MIDDLE WILCOX NEAR YOAKUM, LAVACA COUNTY, TEXAS, William V. Hoyt, consulting geologist, Yoakum, Texas.

A large mid-Eocene channel is evident near Yoakum, Texas, from a study of the electrical logs of more than 50 wells. The channel, clearly erosional, is filled largely with silty shale, in sharp contrast to the sandy continental character of the typical Wilcox strata through which it was gouged.

This channel or canyon can be traced for more than 50 miles, from its mouth near the southeast line of Lavaca County updip north-northwesterly to the outcrop of the Wilcox in Bastrop County. At its maximum development, near the town of Yoakum, it has a width of 10 miles and a depth of approximately 3,000 feet.

A completely satisfactory explanation of the origin is difficult. The factors involved must include the following.

1. The presence of a major stream.
2. The great thickening of the Wilcox now known to exist, to as much as 8,000 feet at the outer edge of the former shelf, which placed an unstable mass of sediments adjacent to deep water.
3. Slumps and slides at the mouth of the large stream, triggered by fault movement and extended inland by stoping guided by the stream channel, created turbidity currents powerful enough to cut a gentle gradient to the sea bottom.
4. An abrupt, brief transgression of the sea resulted in rapid filling of the channel and deposition of a blanket of shale over a large area outside the channel. This was followed by a regression during which the extraordinarily thick and extensive sands of the Carrizo were deposited. These clean massive sands of the uppermost Wilcox entirely obliterated any evidence of the great channel below.

13. TEXTURAL DIFFERENCES BETWEEN TWO TYPES OF SHOESTRING SANDS, John J. W. Rogers and Cyrus Strong, Department of Geology, The Rice Institute, Houston, Texas.

Exploitation of oil and gas accumulations in "shoestring sands" can be aided materially by determining, with samples from even a single well, whether a sand stringer is an offshore bar deposit with a linear shape and lying parallel with the depositional trend, or whether it is a river deposit cutting across the depositional trend and having a sinuous shape. The present research has disclosed textural criteria applicable to well samples which serve to differentiate these two types of "shoestring sands."

Samples taken from rivers and from beaches along the Texas Gulf Coast indicate clear textural differences between the two environments. Compared with river sands, beach sands show an extremely restricted range of mean sizes and sorting coefficients. Furthermore, river sands with sorting coefficients equal to those of beach sands are invariably coarser than beach sands, whereas river sands of the same mean size as beach sands are more poorly sorted. Consequently, plots of mean size versus sorting yield a clear distinction between the two types of sediment.

The foregoing information has been obtained by sieve analyses of unconsolidated sediments. Mean sizes and sorting coefficients of sandstones, however, can be approximated readily by grain counts in thin sections. In 15 minutes, or less, sufficient grains can be counted in section to enable the geologist to differentiate the typical beach and river sands studied in the present work.

14. INFLUENCE OF JACKSON DOME ON SEDIMENTARY FACIES AND EFFECT ON WATER-BEARING PROPERTIES OF CLAIBORNE IN JACKSON AREA, MISSISSIPPI, Joseph W. Lang, U. S. Geological Survey, Jackson, Mississippi.

This paper summarizes the importance of diastrophic uplift of the Jackson dome, which occurred during pre-Tertiary time and may have continued more or less active in the middle Eocene, and its influence on the sedimentary cycles in the Claiborne. The uplifting together with compaction of underlying sediments in the rim-syncline area affected the thickness, character, and attitude of the formations and established controls on the occurrence and quality of the ground waters.

Isopachous maps and stratigraphic sections are presented to show the thicknesses of the Sparta sand and Cockfield formation on and around the dome; they indicate facies and thickness distribution of the sediments in these and several other units, and the size of the structure. Local concentration of lignitic material in the aquifers causes various degrees of straw-colored water affecting its usefulness for certain specific purposes. The pertinent stratigraphic units and the two principal aquifers are described.

15. ANALYSIS OF FACTORS AFFECTING QUANTITATIVE ESTIMATES OF ORGANISM ABUNDANCE, Louis S. Kornicker, Institute of Marine Science, The University of Texas.

Analyses of the distribution of dead organisms in recent sediments is strongly influenced by the method used to establish and report abundance counts. Comparison of abundance counts from recent and ancient strata are affected by the composition of the sediment, its history, and the type of sample upon which counts are based.

Examination of the physical relation between weight and volume sediment samples, and comparison of estimates of organism abundance obtained from equal-volume and equal-weight samples of recent sediment, show that kinds of minerals forming the sediment have little effect on abundance distribution patterns determined by counting the number of specimens in samples of a given weight