quantities of muddy and sandy sediments but such condition does not insure that calcareous sediments will be deposited. Calcareous sediments are precipitated in many ways; some chemical, some physico-chemical, and, most important generally, organic. Organic precipitation is done by both plants and animals, the latter generally readily identified, the former generally indeterminate. Sea bottoms beneath shallow marine waters and protected against entrance of muddy and sandy sediments either because provenances of the sediments are unable to supply such either by reason of being very low or the surface being excellently protected by vegetation, or the sites of deposition being a long way from shore, are the environments that permit the accumulation of widespread deposits of shallow-water marine calcareous sediments. Elevated places on bottoms beneath shallow marine waters may permit calcareous sediments to be deposited in the midst of muddy and sandy sediments. Deep bottoms so far from land that muddy and sandy sediments do not commonly enter are also places of deposition of calcareous sediments.

7. DAN E. FERAY and WILLIAM A. JENKINS, Magnolia Field Research Laboratories, Dallas, Texas. Carbonate Facies of Pennsylvanian Sediments, North Central Texas

Two large limestone masses, in the Canyon series of the Pennsylvanian, crop out in north-central Texas. One of these masses crops out in Wise County and has been referred to as the Chico Ridge reef, the other crops out in Palo Pinto County and has been referred to as the Possum Kingdom reef. During the past 3 years these two limestone masses have been the subject of detailed surface mapping, sampling, coring, and laboratory analyses. Both of these limestone masses change laterally into equivalent shale and sandstone. The surface and subsurface evidence indicates that these two bodies of limestone are of non-reef origin. These limestone masses are examples of stratigraphic-trap carbonate reservoirs.

8. CHARLES A. RENFROE, Columbian Carbon Company, Amarillo, Texas. The Novinger Pool

The discovery well of the Novinger pool was drilled in the latter part of November, 1950, on the T. B. Novinger lease, Sec. 26, T. 33 S., R. 30 W., Meade County, Kansas. At the present time 32 wells have been drilled, of which 27 produce from the Marmaton, 3 from the Morrow, 1 from the Chester, and 1 gas well from the Atoka. Initial potentials on the wells range from 2,204 to 49 barrels of oil per day. The average monthly production of the field is 42,000 barrels of oil. Total accumulative production to the first of August, 1953, is approximately 475,000 barrels of oil. Most of the oil produced is from a porous limestone of Marmaton age. This reservoir is an elongate reef-like body with a north-south trend. Lithologically, it is a relatively coarse textured oölitic limestone with a large percentage of organic debris. The northern limits of the field have been delimited by three wells that cored dense shaly limestone in the stratigraphic interval represented by the Novinger pay on the south. The southern limits of the field are not known. Pay from the Atoka is from a relatively tight shaly sandstone of erratic distribution that apparently marks the Morrow-Atoka unconformity. A small amount of gas has been found in the Atoka. Morrow production is from lenticular sands that occur at various levels throughout the Morrow interval. Although 12 wells have been drilled through the Morrow, only 3 in the north end of the pool have had sufficiently well developed sands to be commercial. These 3 are all oil productive with fairly high gas-oil ratios. Chester production is from porosity developed in coarsely-crystalline crinoidal limestone at or near the Pennsylvanian-Mississippian boundary. Porosity appears to be secondary and was probably developed by weathering of the Chester limestone during the post-Mississippian-pre-Pennsylvanian erosional interval. Only one well is now producing from the Chester, but another was gauged at 14,000,000 cubic feet of gas per day with a spray of oil before it was completed higher in the hole as a Marmaton producer. No wells have been drilled through the Mississippian.

9. EARL MCCRACKEN, Missouri Geological Survey, Rolla. Correlation of the Insoluble Residue Zones of the Upper Arbuckle of Missouri and Southern Kansas

Insoluble residues are used in the Canadian (upper Arbuckle) of Missouri to segregate diagnostic residues and zonal units and to establish, by zonal sequences, the composite order of superposition within formations.

The standard pre-St. Peter geologic column of Missouri, based on residue zones, may be used in Kansas as well as other Mid-Continent states by residue methods.

10. WALLACE LEE, State Geological Survey of Kansas, Lawrence. Thickness Maps as Criteria for Regional Structural Movements

A map, recording the thickness of a sequence of rocks between surfaces that were once flat or relatively flat, records the structural movements that occurred between the development of the limiting surfaces. Such an isopachous map is essentially a structure map of the first surface at the time of the second. The accuracy with which such maps reveal the structural movements that took place during the interval depends on how closely the limiting surfaces approached a plane. They are most accurate where the confining surfaces were depositional. Beveled erosional surfaces are useful where