

physical characteristics of the sandstones but also the nature and distribution of the cementing materials. The sandstones have been divided into two general groups on the basis of the cementing or binding materials: first, those in which the grains are bound together by clay products; and second, those in which crystalline minerals form the cementing material. In the first group effects of compaction were noted. In the second group, sequence of deposition of cementing minerals was observed. The deposition of quartz, dolomite, and anhydrite in the order given is common in some sandstones. In others, quartz and calcite are the only cementing minerals, and of these calcite is the last mineral deposited. Other combinations of these four minerals were observed. Furthermore, sequence of deposition of the same minerals has been established tentatively for the geologic section from the Bell sandstone upward through the Mesaverde sandstone.

Also presented are some probable effects of crystalline cementing materials upon migration and accumulation of oil and gas, upon acid treatment of wells, and upon pressures existing in oil and gas fields.

41. W. C. TOPELMAN, University of Colorado, Boulder, Colorado
Microfaunas of Niobrara and Benton in Foothills of Northern Colorado

This paper is a preliminary report on the first of a series of studies which will attempt to establish recognizable foraminiferal zones in the Cretaceous sequence of eastern Colorado. Because previous reports on the Niobrara and Benton horizons of Nebraska, Kansas, and Wyoming have shown abundant faunas, these horizons in the foothills of the Front Range of northern Colorado were chosen as the most promising for this investigation. Progress thus far reveals a fauna of upwards of thirty species from the Niobrara. Indications are that this fauna is most prolific in the lower 300 to 400 feet of the formation and that this zone should be rather easily recognizable in well cuttings. The upper member of the Benton, which is a sandstone of variable thickness, seems to be entirely barren of fossils. About 125 to 200 feet below this is a zone of limy shale which yields a fair fauna of Foraminifera. This fauna is apparently very similar to, but less abundant than, that of the overlying Niobrara, and can not be readily separated from the latter in northern Colorado.

It is planned to extend this study of the Benton and Niobrara south to beyond Trinidad, Colorado, and also eastward along the Arkansas River to the Kansas boundary. Scattered samples from Benton outcrops north and east of Trinidad indicate a more abundant fauna of Benton age will be found; also that the barren zone of the top of that formation in northern Colorado is not present to the south.

SOUTH MID-CONTINENT

42. H. F. SMILEY, for committee of North Texas Geological Society, Wichita Falls, Texas
New Developments in North and West Central Texas, 1940

The most important development in the North and West-Central Texas area during the year was the remarkable number of new producing horizons discovered. In the K. M. A. field the Ellenburger (Ordovician) was found productive in the western part; two pools on the Bend arch in Young County and one pool on the eastern edge of the Permian Basin in Stonewall County found production in the Chappel limestone (Mississippian); in the Fort Worth syncline, a pool in Clay County and another in Montague County found production in the lower Bend conglomerate; the Caddo (Bend) was found productive in two pools on the Bend arch in Archer County, in two pools in the Fort Worth syncline in Clay County, and in one pool in Montague County; the Strawn series (Pennsylvanian) yielded production in two pools on the Bend Arch in Archer County and in one pool on the east flank of the arch in Clay County; the Canyon series yielded production in two pools on the west flank of the Bend arch in Baylor County, in one pool in Jones County, in one pool in Foard County on the Electra arch, and in one pool in Wilbarger County in the Red River syncline. New production was also found in the Cisco series in practically every producing county in the area, the most significant of which was probably in the Fargo pool in the Red River syncline in Wilbarger County.

Probably the only new stratigraphic discovery in the area was the tentative identification of Viola limestone (Ordovician) in two of the deeper wells in Clay County and two in Montague County and one in Wise County, all in the Fort Worth syncline.

Total production for North and West-Central Texas for 1940 was 49,221,213 barrels.