vanian. The Pennsylvanian rests on Precambrian at the margins of the basin but within the basin variable thicknesses of pre-Pennsylvanian sedimentary rocks are known to occur in thicknesses varying from small amounts up to more than 1,000 feet. Basement rocks are reached in the basin at depths of about 4,500 feet or less. The number of significant tests drilled in this basin to date is comparatively small and is certainly inadequate to disprove this large area. The only oil production in this basin to date is in the southwestern part where some Pennsylvanian production has been developed. Adequate reservoir rocks are known to be present in the pre-Pennsylvanian sediments in many parts of the basin. Ground-water mineralization in the pre-Pennsylvanian sedimentary rocks is generally low but this condition is not believed to be completely unfavorable so far as the possibility of commercial accumulation of petroleum is concerned. The complex geologic history of the region presents some interesting possibilities for the accumulation of oil or gas in commercial amounts.

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Geology of McAlester-Arkansas Coal Basin

The McAlester-Arkansas Coal basin is an elongate arcuate basin in southeastern Oklahoma and northwestern Arkansas. It is bounded by the following: Mississippi embayment on the east, Ozark uplift on the north, Ouachita Mountains on the south, and Arbuckle Mountains on the west.

The stratigraphic sequence ranges from Cambrian through Pennsylvanian age with aggregate thicknesses of 2,000 feet of sediment along the northern rim of the basin to probably in excess of 25,000 feet in the southern part of the area. Paleozoic rocks of late Pennsylvanian age crop out over most of the area. The depositional axis has not been determined by drilling as yet. Geophysical methods may define the basin and clarify the relationship between the Arbuckle-Ozark type rocks and the Ouachita rocks.

Surface structures generally strike east-west and were formed by compressional forces from the south (Ouachita area) against the Ozark positive area on the north beginning in early Pennsylvanian time, and extending into the late Pennsylvanian. The effect of these forces is reflected by the amount of structural relief present; highly faulted structures occur south of the Choctaw fault, well defined structures north of the Choctaw fault, and gentler folds along the Arkansas River.

The basin has been the scene of exploratory work for many years with the greatest and best organized effort being carried out presently. Surface, subsurface, aerial photo interpretation, and geophysical mapping methods have been attempted. Monotonous sequences of sands and shales crop out, making surface work difficult. Rough terrane, poor accessibility, and hard drilling make seismic work expensive. Subsurface work will become increasingly important as more deep wells are drilled.

Gas prospects in Atoka and Morrow rocks are numerous, but a great volume of sediments both Pennsylvanian and pre-Pennsylvanian in age have not been evaluated.

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Interpretation of Ouachita Mountains of Oklahoma as Autochthonous Folded Belt

The Ouachita Mountains of Oklahoma are considered by many as a classical example of large scale, flat overthrusting, and are envisaged as a huge, floating, allochthonous body with a root somewhere farther south.

During extensive geologic mapping between June, 1953, and January, 1956, the authors failed to find large, flat overthrusts in the Ouachita Mountains. On the contrary, the stratigraphic and structural evidence indicates that the mountains are an autochthonous folded system.

The Potato Hills anticlinorium, where the idea of overthrusting was conceived, was mapped in detail. This anticlinorium consists of closely spaced, steep, partly overturned folds. The overturning is both toward the north and, against the supposed overthrusting, toward the south. Some anticlinal limbs have ruptured and steep reverse faults have developed, some of which yield north, others south. All of these faults die along strike, generally in the steep limbs of anticlines.

In the eastern Potato Hills there is the Round Prairie synclinorium which is bounded on opposite sides by faulted, overturned anticlines which face each other. Round Prairie is part of what has been described as a window in a major overthrust. However, the "window" is non-existent. The two border faults are separate, distinct, and die toward the west in unbroken folds. At the eastern end of the "window" the southern fault truncates the northern.

The Choctaw anticlinorium is also autochthonous, as originally determined by Honess (1923). Southward overturning predominates, and slaty cleavage has developed which mostly dips steeply north. This confirms predominant southward yielding and is incompatible with the concept of a great thrust sheet which has moved north.

In the core of the Choctaw anticlinorium the style of deformation changes: steep folds disappear and the cleavage becomes gently inclined. The change is gradual, stratigraphic and structural continuity being maintained. There is no overthrust break and there is no window. This change in structural style with increasing stratigraphic and structural depth suggests that a basal zone of disharmonic shearing-off is approached.

The northern and northwestern border of the mountains has been considered as a great overthrust front with a frontal sole thrust succeeded to the south and east by a number of higher overthrusts. However, none of the structures in this outer zone supports this concept. If flat thrusts were present one would expect strong or uniform northward overturning of folds, and gentle to moderately dipping fault planes. Shearing and strong mechanical rock deformation should be widespread and conspicuous at the overthrusts.

On the contrary, at mapped major overthrusts weak shale sequences are intact and maintain regular bedding despite juxtaposition to mechanically stronger units. The mapped overthrusts are partly steep reverse faults, and partly no faults can be found.

The basis for most mapped "thrusts" apparently has been the tectonic interpretation of the boulder-bearing "Johns Valley shale" as a "friction carpet." However, the boulders of Arbuckle rocks are depositional as are the Ozark region exotics found near Boles, Arkansas. Ulrich (1927) affirmed a depositional origin for these boulders, and the present authors consider his hypothesis of ice rafting as substantially correct. Moreover, though the "Johns Valley shale" customarily is assigned to the interval between the Jackfork group and the Atoka formation, the boulder-bearing shales actually occur as three separate and distinct members within the Jackfork group.

The contrast between the rocks of the Ouachita Mountains and those of the Arbuckle region, though real, is not abrupt. Some units are identical, others differ relatively little, and others differ strongly. Most of the contrasted facies have transitional relationships. Some transitions are gradual; others have been accentuated by shortening resulting from folding and reverse faulting. None exceeds those often encountered in adjacent, connected basins or different parts of the same basin.

Of major importance is the fact that facies changes occur both along and across the structural trend. Moreover, certain units and facies boundaries cross from the Arbuckle region into the Ouachita Mountains. The greatest facies contrast is supposed to be between the Arbuckle limestone and its presumed Ouachita clastic correlatives. However, part of the Ouachita rocks may be younger than the Arbuckle limestone, the customary correlation being open to question. Moreover, below the Ouachita clastic rocks there is a limestone which might correspond with part of the Arbuckle limestone.

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Thrust Faulting along Wichita Mountain Front

The orogeny that produced the Wichita Mountains in southwestern Oklahoma began in early Pennsylvanian, culminated in early Permian, and resulted in a multiple overthrust structural complex along the mobile southern rim of the Anadarko basin. Structure within the numerous fault blocks is complicated by steep dips, overturned folds, etc. Periods of mountain building are reflected by transgressive granite wash facies which confuse the post-Morrow stratigraphy.

Representative cross sections from the mountains into the basin, through wells that have encountered thrust faulting, are presented.

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History and Development of North Madill Field, Marshall County, Oklahoma

The North Madill field is in Secs. 9, 10, 14, 15, 16, 22, and 23, T. 5 S., R. 5 E., Marshall County, Oklahoma. Production is from the 1st, 2d and 3d Bromide sands and the basal McLish sand of the Simpson group.

The structure is a thrust-faulted anticline with the production on the northeast or upthrown block. The date of this faulting and structural formation can not be determined within narrow limits, but it is believed to be of Pennsylvanian age. The Comanchean beds on the surface rest unconformably on rocks of lower Morrowan age and very slightly reflect the underlying structure.

The discovery well was started in August, 1954, and completed in December, 1954, producing from the basal McLish sand.

As of July 1, 1957, the field covered approximately 1,240 acres with 62 producing wells. Total cumulative production to July 1, 1957, was about 1,450,000 barrels. Development is continuing northwest, northeast, and southeast.

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Post-Hunton Unconformity and Its Effect on Pre-Mississippian Distribution in Southern Oklahoma

The post-Hunton unconformity in southern Oklahoma is evidenced by the age of the rocks encountered at the base of the Woodford shale. A pre-Pennsylvanian paleogeologic map, showing surface distribution, accompanied by a pre-Woodford distribution map, illustrates the extent of post-Hunton folding and suggests a tectonic framework for dividing southern Oklahoma into six geologic provinces. Hunton thickness contours define areas of pre-Woodford structural movement. It is suggested that the first pronounced structure building and truncation of Hunton beds occurred during middle Hunton time at the close of the Silurian period. The Hunton exhibits radical variations in