

**XV. PRELIMINARY NOTES ON A NEW GEOLOGIC
MAP OF THE ARBUCKLE MOUNTAINS OF
OKLAHOMA**

C. E. Decker

From Department of Geology, University of Oklahoma

In a preliminary report on the geology of the Arbuckle and Wichita mountains, Joseph A. Taff in professional paper 31, U. S. G. S., in 1904 published a geologic map with scale about $5\frac{1}{4}$ miles per inch. Differentiation of formations was made then as follows:

Pre-Cambrian	Igneous rock
Mid-Cambrian	Reagan sandstone
Cambro-Ordovician	Arbuckle limestone
Ordovician	Simpson formation
Ordovician	Viola limestone
Silurian	Sylvan shale and Hunton limestone
Devonian	Woodford chert
Carboniferous	Conglomerates, sandstone & shale
Carboniferous	Permian "Red Beds"

The Hunton formation was divided into three members. Of these, the lower part of the lower member was correlated with the Clinton of Ohio and St. Clair limestone of Arkansas, and the upper part with the Niagaran. The middle member is correlated with the Helderbergian of New York and the upper member is tentatively correlated with the Oriskany of New York and the Camden chert of Tennessee. Thus the Hunton formation included members belonging to two different periods.

In 1910 the same geologic map with minor changes was reprinted to accompany Bulletin 3 of the Oklahoma Geological Survey. But in connection with this map a number of new structural sections were made by Chester Reeds, showing the major structural features which he worked out in connection with his physiographic studies of the mountains. In this text the Pennsylvanian rocks southwest of the mountains are given the name of the Glenn formation in a columnar section accompanying the report.

In 1911 Chester A. Reeds, after extended faunal studies, published an article in the American Journal of Science on the Hunton formation of Oklahoma, and at this time he subdivided this forma-

tion into four new formations on lithologic and faunal characters. The four new formations he named Chimney Hill limestone and Henryhouse shale of Silurian age, and Haragon shale and Bois 'dArc limestone of Lower Devonian age.

A progress geologic map of the state was printed by Mr. C. W. Shannon in 1916 to accompany part two Bulletin XIX, but no changes of importance were made in the Arbuckle Mountain area. In 1917 on a geologic map of Carter county, some changes in distribution of formations were made northeast of Woodford, and yet at that time the true nature of the structure in that region was apparently not appreciated.

In 1921 R. C. Moore in Volume V. No. 1 of the Bulletin of the American Association of Petroleum Geologists, gives a small scale geologic map of the Arbuckle mountains and adjacent areas and several structure sections. His map of the Pennsylvanian of the Mid-Continent and correlation of different parts of the Pennsylvanian series is very helpful. In one of the larger problems of the area, he follows McCoy's unpublished statement that the Franks is identical with the Seminole conglomerate.

In 1921 the western part of the geologic map of the Arbuckle mountains was used by W. L. Goldston, Jr., as a part of his map of the Glenn formation, but the part covering the Arbuckle mountains was practically the same as that made by Taff in 1904.

Thus we see that comparatively little change has been made in the geologic map of the Arbuckle mountains since the early one by Taff. The work done at that time in differentiating and locating formations was excellent, but of necessity it was somewhat generalized as illustrated by the Hunton, which was described as one formation which later has been divided into four separate formations with distinctive characteristics. Until the present, no attempt has been made to show these on a map as separate formations. Accordingly, there is need for a new detailed map giving the distribution of these formations. Another way in which the older map is generalized, is in the location of contacts between formations; some of these contacts being a mile or more away from the proper location. Also, there is need of greater detail and accuracy in representing the structure of the mountains. For instance a great transverse anticline named by the writer the "Plateau Anticline," has apparently never been recognized. Furthermore, there is need of reinterpretation of some of the structures previously mapped. Thus the structure near Woodford which has been mapped as a fault, and on casual observation looks like a fault with a horizontal displacement of 1000 feet or more, but as the result of critical study this struc-

ture is seen to be a narrow plunging anticline which may be slightly faulted, and to this fold the name of "Woodford Anticline" has been given.

Still another place where greater detail is needed on this map is in the contact of the older formations in the mountains with the younger ones in the adjacent plains. This contact is drawn in a very generalized way while in fact there are outliers of the Permian on top of the older formations and inliers of the older formations out beyond the general eastern margin of the Permian. Formations of various ages abut against the mountains in different parts and the age of some of these surrounding formations is not known, and there has been a great deal of disagreement among geologists in regard to them. Only a comprehensive study of the whole region is likely to clear up these difficulties and locate the formations in their proper places.

Besides the need of a new geologic map of greater detail and accuracy for the reasons enumerated above, scientific information of this sort placed on a new map has a distinct economic aspect. The structure of oil fields near mountains commonly is related to the trend of structure in those mountains. This relation may be closer to the trend of the major folds, or to minor ones transverse to the major folds, depending upon the location of the area in question. Then, too, in the erosional history in the mountains and the deposition about them is locked up the problems of the distribution, composition and texture of formations about them. These considerations are important for upon these characteristics of the rocks together with their structure depends the formation and accumulation of the oil and gas.

In June of last summer a field class of students from the University of Oklahoma under the direction of the writer mapped 15 square miles topographically and geologically on a scale of four inches to the mile. During the progress of this work the advantages of a new map were made evident, and at the close of the course, the writer was given supervision of making a new geologic map of the Arbuckle mountains by Mr. C. W. Shannon, Director of the Oklahoma Geological Survey. A party was organized consisting of the geologist in charge, four field men, and a cook, and during the last month of the summer vacation nearly 100 square miles of the Arbuckle mountains were remapped geologically on a scale of four inches to the mile.

NOTE: Since the meeting of the Oklahoma Academy of Science, G. H. Girty and P. V. Roundy gave a paper at the Shreveport meeting of the American Association of Petroleum Geologists,

changing the subdivision of the Glenn formation and giving some new suggestions in regard to correlation of its parts. After extended studies at the eastern end of the Arbuckle mountains, G. D. Morgan in Circular No. 12 of the Oklahoma Geological Survey places the Franks conglomerate below the center but not at the base of the Pennsylvanian series.