

XXXI. DETAILED GEOLOGY OF THE NORTHERN PART OF MURRAY COUNTY, OKLAHOMA.

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The following paper is a summary of the observations made during the month of June, 1925 in Tps. 1 and 2 S., Rs. 1 and 2 E. This area was the site chosen for the field work carried on by a class of the University of Oklahoma in Field Geology.

The Arbuckle Mountain area of south-central Oklahoma has been mapped in a reconnaissance way, first, by Joseph A. Taff of the United States Geological Survey and later by C. A. Reed and various other individuals who were interested in some particular problem. Detailed maps of small areas have been prepared from time to time and something like ten or twelve townships have been detailed by various summer classes of the University of Oklahoma.

The area is of particular interest to students of Geology, inasmuch as it offers a remarkable great variety of formations which can be reached in a very small area. Representative formations of each geological period from the Pre-Cambrian to the Permian are exposed and can be studied in detail within a horizontal distance of two miles. From the standpoint of structural geology the area is of particular interest since it contains all types of faulting ranging from those of displacement of an inch to those having a vertical displacement of one mile. Likewise folds varying in degree and intensity from those too small to be readily observed to those that are completely overturned are abundant. Other structural features such as unconformities, cleavage, jointing, etc., are widespread and easily determined.

The particular features which I wish to point out that are exhibited in the area are as follows:

1st. The large overturned fold which extends throughout the area northwest to southeast and includes all of the formations outcropping in the region. The northeast limb of this fold dips southwest at an angle of approximately 70 degrees, so that the older formations such as the Simpson, Viola, and Sylvian overlying the younger Woodford, Bois d'arc, Haragon, Chimney Hill, and Caney. The southwestern limb of the fold is partially obscured by the Franks conglomerate, but may be observed on either side of Honey Creek.

2nd. In Sec. 4, T. 2 S., R. 2 E. occurs a remarkable S-shaped

fold which is best developed in the Viola limestone and easily recognized on account of the topographic expression of this formation.

3rd. The great unconformity at the base of the Franks conglomerate on either side of Honey Creek and north of the East Timbered Hills. This unconformity is very marked since it represents a time interval involving most of the Paleozoic time and the attitude of the conglomerate is in marked contrast to the steeply dipping beds of the Arbuckle and Simpson upon which it rests.

4th. The faults of the area. These include:

(a) The fault at the contact of the Arbuckle and Colbert porphyry which is marked in the field by the local absence of the Reagen sandstone that outcrops further south.

(b) The faulting at the contact of the Arbuckle and Simpson which is particularly well shown in the SE $\frac{1}{4}$ of Section 4, R2E, T2S. These faults appear to be small normal faults with the south side as the upthrow side. Each fault causes the contact to be shifted to the east on the south side of the fault.

(c) The faulting within the Simpson at many points, but particularly well shown in Secs. 30 and 31, T. 1S., R. 1 E. At this point a large fault extends from the Viola limestone on the north to the Franks conglomerate on the south and causes a marked off-setting of the beds in the Simpson formation.

(d) The pronounced faulting in Sec. 14, T. 1S, R. 1E. which causes the Viola outcrop to be repeated until the thickness is more than doubled.

The influence of the lithologic character of the various formations and of the structure of the rocks on the topography of the area is very easily seen in the field. The limestone formations make the ridges and broad plateaus while the softer shales and sandstones form the intervening valleys. Likewise, the sharply dipping rocks of the resistant formations form extensive hog back ridges parallel with the strike of the rocks and practically continuous throughout the entire length of the outcrop except where traversed by the larger streams such as Fall Creek and Honey Creek. It should be noted that the geological section exposed in this area represents a total thickness of more than eight thousand feet. This is of particular interest when it is realized that the stratigraphic section of north central Oklahoma as revealed by well logs shows a very slight representation of many of these geologic systems.

The extensive travertine deposits found in Fall Creek and Honey Creek within this area are of considerable interest since they are the cause of the numerous waterfalls which make this area one of the principal points of scenic beauty in the State of Oklahoma. These waterfalls ranging in height from two or three feet to seventy feet together with the steep rockwalled valleys give to this area an appearance of mountain scenery which is remarkably different from the plains area of Oklahoma. Numerous springs feed the clear streams so that the larger streams run the year round. A single large spring on Fall Creek affords water supply for almost one thousand people during the month of August.