

### XXXIX. CORRELATION OF THE WHITEHORSE SANDSTONE

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The Whitehorse sandstone<sup>1</sup>, originally described as the Red Bluff sandstone<sup>2</sup>, may be defined as a persistent stratigraphic unit of the upper Permian measures. With reference to its stratigraphic position, the sandstone is the middle member of the Woodward<sup>3</sup> formation, which consist of the basal Dog Creek shale or division, the middle Whitehorse sandstone member or division, and the upper Day Creek dolomite member or division. There has been proposed<sup>4</sup> recently, a new classification<sup>4</sup> of the upper Permian Red Beds, in which the members of the Woodward formation are described as distinct formations and the use of the term "Woodward" is abandoned.

The areal distribution of the Whitehorse sandstone is represented by a varying band of exposures extending over large areas in Kansas, Oklahoma, and Texas. The sandstone may be traced in an almost continuous line of outcrops, from a point on Bluff Creek, fourteen miles north of Ashland, in Clarke county, Kansas, southeastward, to a point one mile south of Marlow in Stephens County, Oklahoma; then, from that locality in Stephens County, westward, with a flexure around the northern limb of the Wichita Mountains, to a point ten miles west of Dozier, Texas, in Collingsworth County; thence, from that locality, southwest, to the exposures along the Red River in southwestern Hall

<sup>1</sup>Gould, C. N.; *Geology & Water Resources of Oklahoma*: U. S. Geol. Survey, Water Supply Paper 148, p. 52, 1905.

<sup>2</sup>Cragin, F. W.; *The Permian System in Kansas*: Colo. Col. Studies, vol. 6, p. 40, 1896. The name Red Bluff has been used for another formation, previously.

<sup>3</sup>Gould, C. N.; *Oklahoma Gypsum*: Sec. Bien. Rept., Dept. of Geol. and Nat. Hist., 1902. Named from Woodward County, Oklahoma.

<sup>4</sup>Gould, C. N.; *A New Classification of the Permian Red Beds*: Am. Assn. Pet. Geol. vol. 8, p. 322-341, 1924.

County, and thence from Hall County, southward, to the exposures along the Colorado River in Coke County, Texas.

The stratigraphic position of the Whitehorse sandstone, with respect to those Permian horizons, or formations, immediately above and below its beds, has been of material value in correlations.

In the Texas Panhandle along the Canadian River as well as in the Kansas and the northern Oklahoma areas, to as far southward as the Washita River, in west-central Oklahoma, a hard, massive stratum of dolomite, known as the Day Creek dolomite<sup>4</sup>, caps the latest of the sandstone horizons. The Day Creek formation, which is conformable upon the Whitehorse formation, weathers into characteristic escarpments and buttes, which thus gives a dominant form of relief to the area of its outcrop. Wherever the dolomite has not been removed by erosion, it affords an ideal horizon marker for correlating the out-crops of the sandstone.

Below the Whitehorse occurs the Dog Creek formation<sup>5</sup> a dull-red argillaceous shale, with laminae of gypsum in the basal portion and one or two discontinuous ledges of dolomite in the upper part. Extensive field work has shown that the Whitehorse sandstone in wide areas, of more than local designation, rests unconformably upon the Dog Creek shale. This unconformity, while it is most pronounced, at least locally, is by no means continuous. At other localities, where the contact between the Dog Creek and the Whitehorse has been studied, the relationship of the two formations is one of conformity. Often, the intergradation of the shale into the sandstone, above, is so gradual and uniform that the contact cannot readily be discerned.

In correlating the sandstone formation, it has been observed that the Whitehorse always presents a definite stratigraphic relationship with the Blaine formation. Below the sandstone formation is the intervening Dog Creek shale, which rests conformably upon the Blaine gypsum beds. In those areas then, where both the Whitehorse and the Blaine happen to be exposed, the latter beds afford an accurate horizon for use in mapping the exposures of the sandstone.

C. N. Gould, in a notable contribution on the geology of

<sup>4</sup>Cragin, F. W.; loc. cit., p. 44. Named from Day Creek, Clarke County, Kansas.

<sup>5</sup>Cragin, F. W.; loc. cit. p. 39. Named from Dog Creek, Barber County, Kansas.

the Permian red beds' has shown that the Blaine formation extends in a line of exposures from northern Barber county, Kansas, southward into Oklahoma, thence, through Oklahoma, southwest, into Texas, as far as the Concho River in the west-central Texas region. Throughout this long line of outcrop, which very closely parallels the line of Whitehorse sandstone exposures, the Blaine formation presents a continuous series of exposures, the one or more beds, except for a more or less attenuated line of exposures, in Grady and Caddo counties, of the central Oklahoma region.

For purposes of classification, the following tables shows the divisions and subdivisions of the upper Permian for the Kansas-Oklahoma area and for the Texas area.

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<sup>1</sup>Gould, C. N.; A New Classification of the Permian Red Beds: Am. Assn. Pet. Geol. vol. 8, p. 331-334. 1924.

Kansas-Oklahoma Area. (After Gould, modified.)

**FORMATION**

Quartermaster, (Big Basin sandstone.)

Cloud Chief. (Hackberry shale.)

Day Creek dolomite.

Whitehorse sandstone.

Dog Creek shale.

Blaine.

Upper  
Enid.

Chickasha member or division.  
Duncan sandstone, member or  
division.

Lower Enid.

**Correlation Table for the Texas-Oklahoma Areas**

Texas Area	Oklahoma Area	
Double Mountain formation.	Whitehorse formation.	
	Dog creek formation.	
	Blaine formation.	
	Upper Enid.	Chickasha. Duncan.
Clear Fork formation.	Lower Enid	