

Stratigraphy of the Vanoss Formation In the Western Arbuckle Mountains¹

MYRON E. MCKINLEY, Oklahoma Geological Survey, Norman.

The Vanoss formation was named by Morgan (2) from outcrops near Vanoss, Pontotoc County, Oklahoma, where it consists of arkosic shales. It is underlain conformably by the Ada formation and overlain by the Hart limestone, at the base of which Morgan placed the Permian-Pennsylvanian boundary. Morgan showed that the limestone conglomerates in the vicinity of Sulphur were in the Vanoss formation and therefore were of late Pennsylvanian age, whereas earlier it had been believed that these conglomerates were a part of the Franks conglomerate of Middle Pennsylvanian age.

Westward from Sulphur the Vanoss formation rests unconformably on the highly folded Paleozoic rocks of the Arbuckle Mountains and is overlain with apparent conformity by the Hart limestone (1). In this area the Vanoss formation is divisible into a lower member of limestone conglomerate and an upper member consisting essentially of red shale. These units have been mapped by the writer in connection with the preparation of the new geologic map of Oklahoma, now being compiled by Dr. Hugh D. Miser of the U. S. Geological Survey.

Differential relief resulting from erosion of the folded rocks of the Arbuckle Mountains in late Pennsylvanian time probably exceeded 500 feet. The first deposit on this irregular surface is the conglomerate member of the Vanoss formation, which filled depressions on the north flank of the Arbuckle anticline where large streams were flowing northward. The succeeding red shales of the upper member of the Vanoss formation were deposited on high parts of this erosional surface, completely overlapping the conglomerate member on the south flank of the Arbuckle anticline and locally overlapping it on the north flank. The Hart limestone in turn locally overlaps the shale and rests on the highest parts of the erosional surface, being in unconformable contact with the Viola limestone and upper formations of the Simpson group in SW $\frac{1}{4}$ sec. 23, T. 1 S., R. 2 W., and with the Springer formation in sec. 30, T. 2 S., R. 1 W.

CONGLOMERATE MEMBER OF THE VANOSS FORMATION

This member consists of a well-bedded sequence of limestone boulders, cobbles, and pebbles in a calcareous matrix. Although the coarse clastics are predominantly limestone, all the exposed rocks of the Arbuckle Mountains, including the Colbert porphyry, are represented in this conglomerate.

In addition to the calcareous material, the matrix of the bedded conglomerates locally contains sand grains and an abundance of finely dispersed

¹Published by permission of the Director, Oklahoma Geological Survey.

red clay. Red shale partings are common throughout the unit, and on weathering give a red color to the rock.

The conglomerate member of the Vanoss formation is confined to the north and northwest flanks of the Arbuckle anticline, extending from Sulphur westward to the vicinity of Eightmile Creek, sec. 18, T. 1 S., R. 1 W., which is the westernmost extent of the conglomerate member as mapped. From this area westward and southward around the Arbuckle Mountains the conglomerate member is overlapped by the shale member of the Vanoss formation.

In its area of outcrop the conglomerate member is generally between about 100 feet and 500 feet in thickness and is subject to abrupt change where the depositional surface on the underlying folded rocks is highly irregular. In one locality the conglomerate thins notably and is absent for approximately 1 mile in secs. 3 and 4, T. 1 S., R. 1 W., where the shale member of the Vanoss formation rests directly on Cambrian rocks. This locality represents a hill on the pre-Vanoss erosional surface, over which the conglomerate was not deposited.

The contact of the conglomerate member with the overlying shale member of the Vanoss formation is mapped at the base of the red shale sequence containing loosely cemented, thin layers of limestone conglomerate in its lower part. Rocks of the conglomerate member for the most part are thoroughly cemented. The boundary between the conglomerate and shale members is recognized as being gradational, although it is roughly parallel with the Hart limestone and therefore is a reasonably close approximation to a time horizon.

SHALE MEMBER OF THE VANOSS FORMATION

This member is composed predominantly of maroon shale containing lenses of loosely cemented limestone conglomerate, locally as much as 10 feet thick. The conglomerates are most abundant in the lower part of the unit.

Nodular calcareous concentrations and thin "birdseye" limestone lenses are distributed sporadically throughout the member but are most abundant in the upper part, indicating a probable gradation from the red shales of the Vanoss into the overlying Hart limestone.

In the type area north of the Arbuckle Mountains, the Vanoss formation contains many lenses of arkose that evidently were derived from wide outcrops of granite in the Tishomingo anticline. In the western Arbuckles, however, arkose is conspicuously absent and has not been observed in the shale member of the Vanoss formation. Probably the nearby exposures of porphyry in the East and West Timbered Hills were not extensive enough to contribute an abundance of feldspathic materials.

Except for two small areas where it was not deposited, the shale member of the Vanoss extends completely around the western part of the Arbuckle Mountains. On the north flank of the Arbuckle anticline it rests at most places on the underlying conglomerate member, whereas on the south flank it rests on folded rocks of the Arbuckle Mountains that range in age from Arbuckle through Springer. It appears that the overlapped conglomerate member was never deposited on the south flank, as that part was too high or had too gentle a slope to receive thick conglomerate deposits.

The shale member shows a wide range in thickness, being thickest in the area between the Washita River and Sulphur, and thinnest at the western edge of the Arbuckle Mountains. At the western edge, in the area immediately east of Pooleville, topographic highs of older rocks were emergent during all of Vanoss time. The Vanoss shale overlapped the sides

of such hills, the thickness at any locality being determined by its position on the hill slope. At two localities the thickness of the shale member was measured and found to be 30 and 78 feet, and at two other localities it is absent by nondeposition, and the Hart limestone rests directly on folded pre-Vanoss rocks.

Thicknesses of the Vanoss shale have not been measured on the north side of the Arbuckle anticline, but are estimated to be approximately 150 feet in the area west of the Washita River, and much greater eastward toward Sulphur.

SUMMARY AND CONCLUSIONS

The conglomerate member of the Vanoss comprises a deposit of coarse clastic material laid down at or near the shore line of a rather high, rapidly eroding landmass. The greatest thicknesses of conglomerate probably were deposited in troughs or basins into which numerous large streams flowed. The presence of this member on the north flank of the Arbuckle anticline and its absence on the south flank, indicate that the northern part of the landmass had the most pronounced relief during Vanoss time.

The abrupt thinning of the Vanoss formation and the local contacts of Hart limestone with the folded pre-Vanoss rocks on the west and south flanks of the Arbuckle anticline indicate a topographically high area at the western end of the Arbuckle Mountains within which certain small areas remained emergent, as islands, throughout all Vanoss time.

Thus it appears probable that during most of Vanoss time the western Arbuckle Mountains formed an exposed landmass, asymmetrical in a north-south section, with a high, rapidly eroding area on the north side which furnished coarse material for deposition near the shore, and an area of relatively gentle slope on the south flank which furnished only small amounts of coarse material for the southward-flowing drainage.

REFERENCES

1. BIRK, RALPH A. 1925. Extension of a portion of the Pontotoc Series around the western end of the Arbuckle Mountains. *Bull. Am. Assoc. Petrol. Geol.* 9: 983-989.
 2. MORGAN, GEORGE D. 1924. *Geology of the Stonewall Quadrangle, Oklahoma.* Bureau of Geology, Norman, Oklahoma, *Bull.* 2. pp. 133-137.
-