THE UNCONFORMITY AT THE BASE OF THE BIRCH CREEK LIMESTONE

MALCOLM C. OAKES, Norman

The limestone here mapped as the Birch Creek limestone has been mapped previously by geologists of the United States Geological Survey, working in Osage County, as Birch Creek limestone [1], Panther Creek limestone [2], and Stanton limestone [3]. It is probably equivalent to the Little Kaw [4] limestone member of the Stanton limestone of Kansas. The name Birch Creek is here retained because of its priority. The confusion seems to have arisen because each geologist worked in a limited area, and lacked acquaintance with the problem as a whole.

In the course of field work over a much wider area, the writer has seen evidence that immediately preceding deposition of the Birch Creek, 100 feet or more of sediments were removed by erosion in some localities and little or none in others. The Birch Creek limestone rests on the eroded tops of three distinct units, the Wann formation*, the Torpedo sandstone [5], and the unnamed shale above the Torpedo.

At its type locality[6], in sec. 25, T. 24 N., R. 10 E., and southward, the Birch Creek rests on shale of the Wann formation. Near the E¼ corner of sec. 25, T. 24 N., R. 11 E., it rests on sandstone which the writer interprets as a pre-Birch Creek outlier of the Torpedo sandstone. From this locality northeastward to the vicinity of the W¼ corner of sec. 15, T. 25 N., R. 12 E., wherever found, the Birch Creek usually rests on shale of the Wann formation but occasionally on Torpedo sandstone. The Birch Creek limestone rests on Torpedo sandstone or is separated from it by a few feet of shale across the northeast part of T. 25 N., R. 12 E., and over a large area in T. 26 N., Rs. 11 and 12 E. It rests on the unnamed shale above the Torpedo sandstone across Tps. 27 and 28 N., Rs. 12 and 13 E., and again comes in contact with the Torpedo sandstone near the W¼ corner of sec. 14, T. 29 N., R. 13 E., where the Torpedo is about 30 feet thick. It continues in contact with the eroded top of the Torpedo sandstone to the vicinity of the NW corner of sec. 13, T. 29 N., R. 13 E., where the Torpedo is only 2 feet thick.

Throughout the area mapped, the Birch Creek limestone is overlain by a unit composed of the Okesa sandstone [7] of Clark and its underlying shale. In some localities this unit is practically all sandstone, while in others it is little more than a sandy shale. For the purposes of this discussion, the entire unit is designated the Okesa sandstone.

The Birch Creek limestone itself is extremely variable in both thickness and character, along its outcrop, and this, together with its various associations with sandstone and shale, both above and below, contributed greatly to the confusion attending attempts to correlate its various exposures. For instance Hopkins, who did not recognize the presence of an unconformity, thought that the Okesa and Torpedo sandstones merged into a single series in Tps. 24 and 25 N., Rs. 11 and 12 E., and that the Birch Creek limestone lay "at the base or at some places 12 to 15 feet above the base of this series of sandstones" [8] in T. 24 N., R. 11 E., and therefore at or near the base of the Torpedo sandstone. He saw the Birch Creek limestone (later named the Panther Creek limestone) in the north part of T.. 25 N., R. 12 E., but since it is clearly above the Torpedo sandstone, which at that point is 15 to 20 feet thick, he believed that this limestone was 15 to 20 feet above the horizon of the Birch Creek limestone.

* Restricted and redefined to apply to all strata between the top of the Iola formation, below, and the base of the Torpedo sandstone, above, or the base of the Birch Creek limestone in areas where the Torpedo sandstone was removed by pre-Birch Creek erosion.

REFERENCES

1 White, David, and others. Structure and oil and gas resources of the Osage Reservation, Oklahoma. U. S. Geol. Survey Bull. 686, p. 17, 1922.
2 *Idem.*, p. 397.
3 *Idem.*, p. 95.
4 Moore, Raymond C. Stratigraphic classification of the Pennsylvanian rocks of Kansas. Kansas Geol. Survey Bull. 22, p. 136, 1935.
5 White, David, and others, *op. cit.*, p. 76
6 *Idem.*, p. 17.
7 *Idem.*, p. 95.
8 *Idem.*, p. 239.

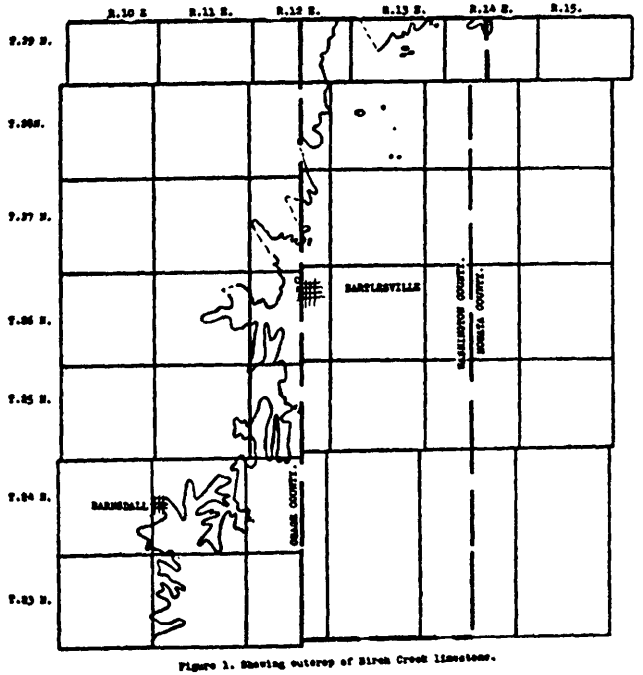

Figure 1. Showing outcrop of Birch Creek limestone.

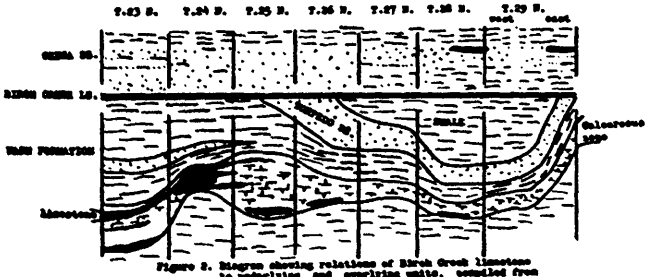

Figure 2. Diagram showing relations of Birch Creek limestone to underlying and overlying units, compiled from outcrop measurements.