
The Unconformity at the Base of the Barnsdall Formation in Oklahoma

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At the meeting of the Academy in Tulsa, December 8th and 9th, 1939, the author described the unconformity at the base of the Barnsdall formation in Washington and Osage Counties under the title: "The Unconformity at the Base of the Birch Creek Limestone" (1). That was 13 years ago, and in the meantime he has, with the aid of several graduate students of the University of Oklahoma, mapped the same unconformity southward across Osage, Pawnee, Tulsa, Creek, and Okfuskee Counties to the North Canadian River. The Birch Creek limestone is irregularly but progressively more sandy southward and grades into the basal bed of the Okesa sandstone, in T. 22 N., R. 10 E., Osage County. It was found advisable, for cartographic purposes, to include the Birch Creek limestone and the Okesa sandstone in the lower part of a new unit named the Barnsdall formation (4). Hence the title of this paper.

At the Kansas-Oklahoma line the Barnsdall formation rests on the Torpedo sandstone, which at that place was reduced to a thickness of 2 feet by pre-Barnsdall erosion (3). Farther south the Torpedo is about 60 feet thick and an unnamed shale, locally about 95 feet thick, overlies the Torpedo sandstone and is overlain in turn by the Barnsdall formation. South of T. 23 N., R. 12 E., both the Torpedo sandstone and the overlying shale were removed by pre-Barnsdall erosion, and the Barnsdall rests on progressively lower parts of the Wann formation. In the south part of T. 16 N., R. 9 E., the Barnsdall rests on the Iola formation. Across Tps. 15 and 14 N., R. 9 E., the basal sandstone of the Barnsdall caps a prominent escarpment where it generally rests on shale in the Chanute formation; but remnants of the Iola formation have been found from place to place, mostly in the debris along the talus slope. From Deep Fork River to the South Canadian River, no evidence of the Iola formation has been found, and the Barnsdall formation rests on the Chanute formation (3).

The Barnsdall formation is overlain unconformably by rocks at the base of the Virgil group from sec. 28, T. 13 N., R. 8 E. southward to the North Canadian River (8). Representatives of the Barnsdall probably do not extend much if any farther south, and basal Virgil rocks rest unconformably on Chanute and successively older rocks southward to the north flank of the Arbuckle Mountains.

The author knows of no place in Oklahoma where the unconformity at the base of the Barnsdall would be suspected from local observations alone. It is evident only after extensive mapping. In many localities basal Barnsdall rocks rest on shale, and it may very well be that in some of these localities the actual unconformable contact is, in this shale, lower than the base of the Barnsdall.

The Birch Creek limestone, the basal member of the Barnsdall in northern Oklahoma, is probably equivalent to the South Bend limestone, the uppermost member of the Stanton formation in Kansas, Missouri, and Nebraska. If this is true, we should expect evidence of an unconformity at or somewhat below the base of the South Bend. The South Bend member is succeeded in descending order by the Rock Lake shale and the Stoner limestone members of the Stanton. According to Moore, (5) the contact at the base of the Rock Lake shale is irregular at many places in Kansas, suggesting a slight disconformity, and in Nebraska the Rock Lake contains a red zone which signifies emergence. It seems, then, that the unconformity at the base of the Barnsdall formation in Oklahoma probably records an emergence which extended far beyond Oklahoma and may be of regional significance.

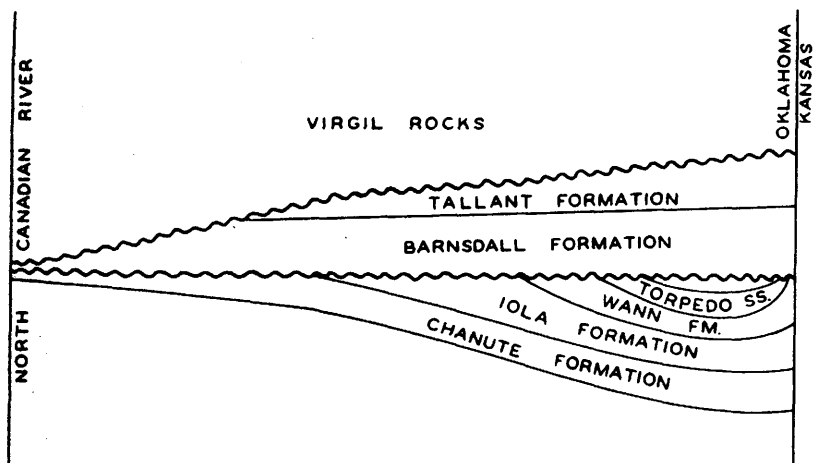


FIGURE 1. Diagram, Not to Scale, Showing the Unconformity at the Base of the Barnsdall Formation, in Oklahoma, from the Kansas-Oklahoma Line to the North Canadian River.

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