

## A Study of the Stratigraphy and the Preglacial Topography of the DeKalb and Sycamore Quadrangles

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This geologic study of the DeKalb and Sycamore quadrangles includes the collecting, compiling, and interpreting of the data from nine hundred and fifty well log records. These data made possible the constructing of a preglacial topographic map, an areal geologic map and two structural sections.

Since there are no rock outcrops within the area, the field data were limited to well records. A total of nine hundred and fifty well records were collected, forty-six of that number were furnished by the Illinois State Geological Survey, three hundred and thirty-three were secured from farm owners and the remaining four hundred and twenty-one logs were taken from the records of well drillers.

The preglacial topography of the DeKalb and Sycamore quadrangles was governed by two dendritic stream valleys which flowed to the southwest across the area. The Shabbona stream drained the DeKalb quadrangle and the Hinkley stream drained the Sycamore quadrangle.

The Shabbona river flowed south out of the DeKalb quadrangle near Shabbona. It possessed a gradient of 3 to 5 feet per mile, and its lowest level was less than 500 feet above sea level. Its channel lay near the preglacial surface contact of the Galena and the Maquoketa formations. Its drainage divide to the west had summit elevations of 750 feet in the north-west part of the quadrangle and 700 feet in the southwest.

The Hinkley river was located in the south central part of the Sycamore quadrangle. This stream had two main branches, one flowing south from the center of the quadrangle and the other flowing southwest along the south edge of the quadrangle. The writer has referred to these two branches in this paper as the Maple Park and Big Rock branches. The gradients of these streams averaged near 5 feet per mile in their lower courses with minimum stream bed elevations of 550 feet for the Maple Park branch and 500 feet for the Big Rock branch. Their drainage divide summit levels varied from more than 800 feet above sea level in the north to 650 feet in the south.

In large part, the bedrock relief of these two quadrangles is explained by preglacial stream erosion of rock strata of differing hardness and to a lesser degree by structural features. The existence of the preglacial Rock river near the west edge of this region may have made possible the high gradient streams and the parallel dendritic drainage patterns. The west half of the DeKalb quadrangle has its bedrock surface lying in the upper levels of the Platteville-Galena formation, making possible the flat divides and rather abrupt valley slopes.

The lower horizons of the Maquoketa formation dominates the valley slope in the east half of the DeKalb quadrangle. Along the extreme east

edge of the quadrangle, the middle horizon of the Maquoketa formation consists largely of dolomite. Its superior hardness helped the valley slope to be steep.

The northwest part of the Sycamore quadrangle contained the Niagaran formation which helped hold the softer upper portion of the underlying Maquoketa formation in position. Relatively steep slopes bordered this cap rock. The east half of the Sycamore quadrangle was covered almost entirely with a 25 feet to 30 feet capping of the Niagaran formation. Where the streams had cut through this resistant cover to the south and west, steep valleys were common. One valley south of Maple Park had a width of three miles and a depth of more than 150 feet.

By and large, the main aerial extents of the formations were fairly easily determined. Certain localities, however, offered problems. For example: the patches of Maquoketa rock shown west of the Shabbona river and which rests on the Galena dolomite drainage divide, were suggested by well records in sections 20, 21, 4, and 5, Milan township, DeKalb quadrangle. The extent of these patches of Maquoketa were postulated by using known dip values and the bedrock surface contour map. Other problems of a similar nature encountered in the making of the areal map were dealt with in like fashion.

The stratigraphy and structure has been determined from a study of approximately 25 deep well records with a fair geographical distribution throughout these two quadrangles. These wells vary in depth from 500 feet to more than 3000 feet. Thickness values for various Cambrian formations occurring here are as follows: Mt. Simon 1380 feet, Eau Claire 420 feet, Dresbach 145 feet, Franconia 80 feet, and Trempealeau 551 feet. These Cambrian sediments were practically all sandstone with the exception of the Trempealeau, which was largely a cherty dolomite.

The Ordovician sediments include the Prairie du Chien with a thickness varying from 55 feet in the west to 80 feet in the east. An unconformity occurs at the top of this formation. The St. Peter formation varies in thickness from 330 feet at Creston to 80 feet at Elburn. The Glenwood formation is largely a calcareous shale and is found at the top of the St. Peter. It varies in thickness from 95 feet in the west to 55 feet in the east.

The Platteville-Galena formations are consistent in thickness and character throughout this area, with an average thickness of 345 feet.

In a few places in the east part of the region, the Maquoketa formation is shown with its full thickness of 127 feet. This formation has three lithologic types from bottom to top. The lower 35 feet is a soft black shale interbedded with dolomite, the middle 37 feet is a fairly compact dolomite, while the upper 35 feet is composed of a calcareous shaly dolomite.

The Niagaran formation does not occur in its total thickness at any place in the two quadrangles.

Two geologic sections have been constructed to show the salient features of structure. The section on line A-B crosses the area on a line through Creston, Malta, DeKalb, Cortland, Maple Park, and Elburn. The section on line C-D crosses the area on a line through DeKalb to one mile east of Waterman.

In general, the strata have a dip slope to the southeast. Two horizon markers were employed; namely, the top of the Glenwood and the base of the Maquoketa formations. The average dip of the Glenwood from Malta to Elburn, a distance of about 20 miles, is from 7 feet to 10 feet per mile. In contrast to this value, the average dip from Creston to Malta, a distance of 5 miles, is nearly 60 feet per mile. From the northwest corner of the region to the southeast corner, the change in stratigraphic levels amounts to 560 feet in a distance of 40 miles.