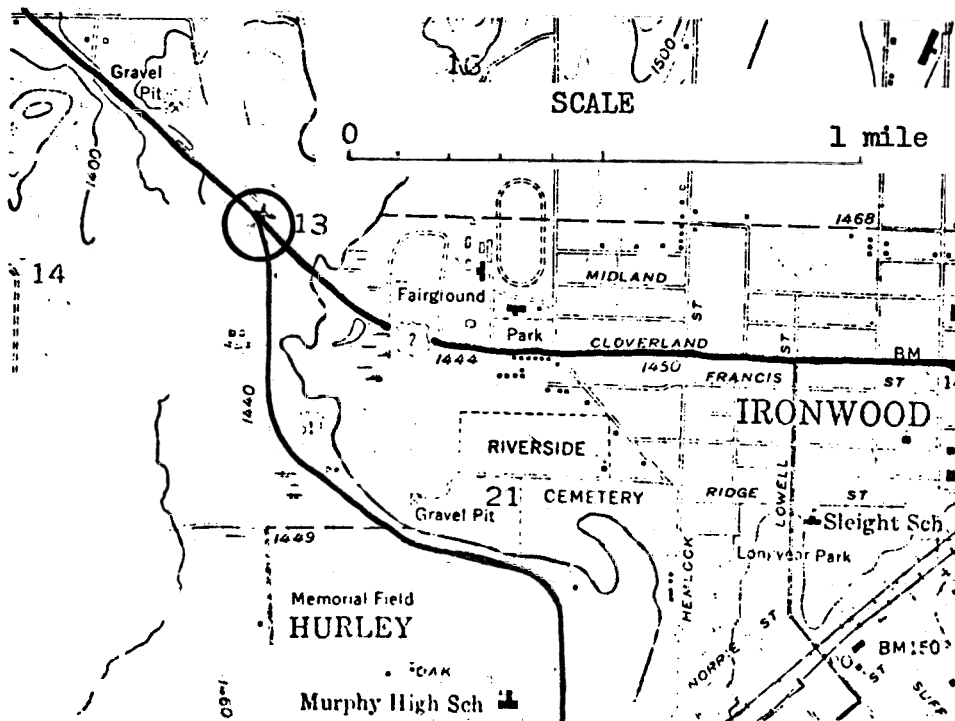


Title: Tyler Formation

Location: SE $\frac{1}{4}$, SE $\frac{1}{4}$, NE $\frac{1}{4}$, Sec. 14, T.46N., R.2E.

Hurley, Wis., on U.S. Highway 2 beneath overpass at junction with U.S. Highway 51.



Author: Gene L. LaBerge

Description: This exposure is characteristic of most of the Tyler Formation (Aldrich, 1929). The unit is generally referred to as the Tyler "Slate" although slates makes up less than one-third of the formation; graywacke sandstone makes up a majority (Alwyn, 1976). The formation is over 7,000 feet thick here, and increases to about 12,000 feet at Mellen (Alwyn, 1976). To the east it has been completely removed by erosion prior to deposition of Keweenaw rocks (Schmidt & Hubbard, 1972). The rocks here are only slightly metamorphosed. Graded beds and other primary sedimentary structures indicate that the beds are not overturned (Schmidt & Hubbard, 1972).

Note that the rocks dip steeply to the northwest, and that the cleavage dips less steeply than the bedding. This cannot be axial plane cleavage developed at the time the rocks were tilted to their present position because if that were the case the cleavage should dip more steeply than the bedding as shown in Figure 1A. Since axial plane cleavage (or fracture cleavage) dips more steeply than the bedding, it must have formed during an earlier deformation when the rocks were dipping to the south.

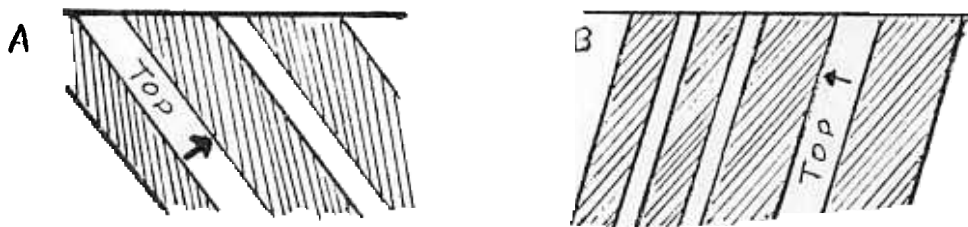


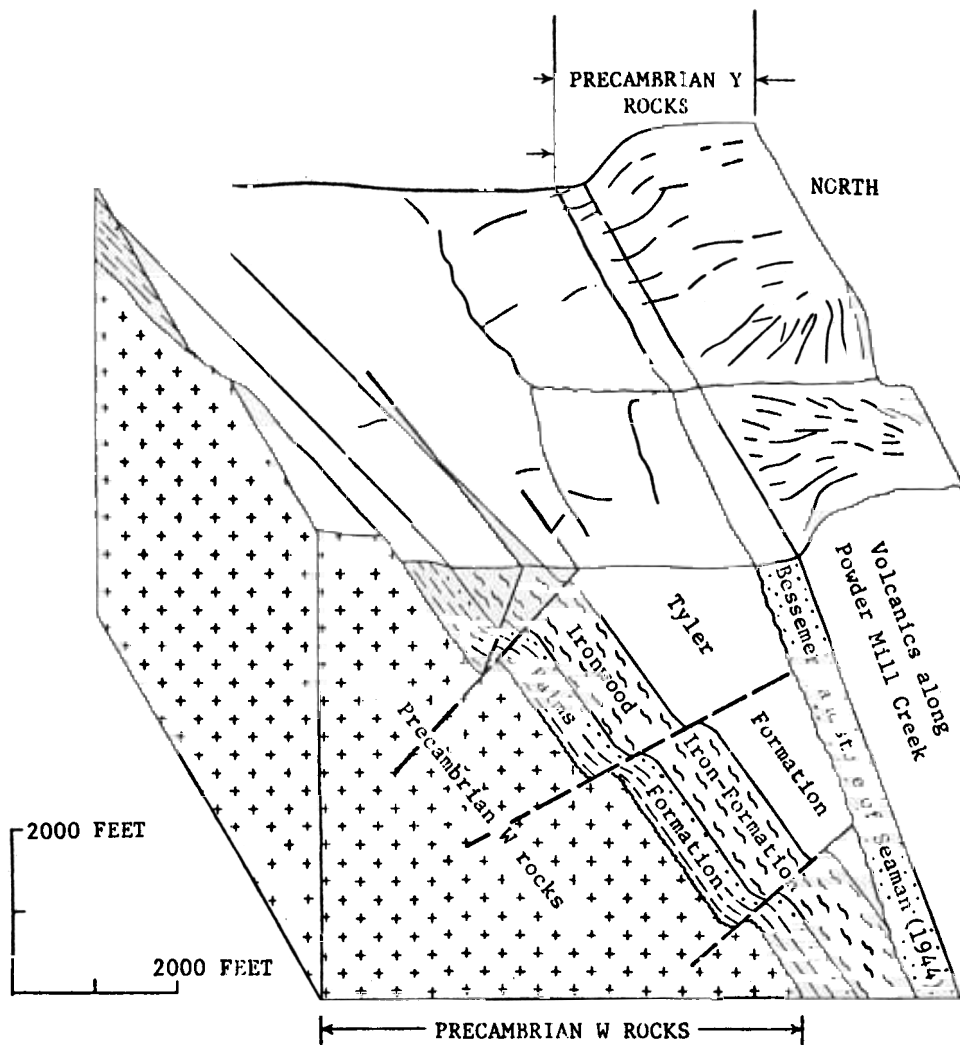
Figure 1. A represents normal relationship where the cleavage dips more steeply than bedding. B represents situation at this outcrop. Note that if A is rotated counterclockwise about 100° both bedding and cleavage are parallel with B.

Significance: The Tyler Formation is part of a very thick, extensive unit known variously as the Michigamme Formation in Michigan and the Virginia and Thomson Formations in Minnesota. These formations are all remarkably similar, in appearance and all overlie the Middle Precambrian iron-formations of the Animikie Basin. They are derived in part from the erosion of older Precambrian granitic rocks (Alwyn, 1976), and in part from erosion of contemporaneous volcanic islands. The rocks were deformed and metamorphosed slightly during the Penokean Orogeny about 1800 million years ago.

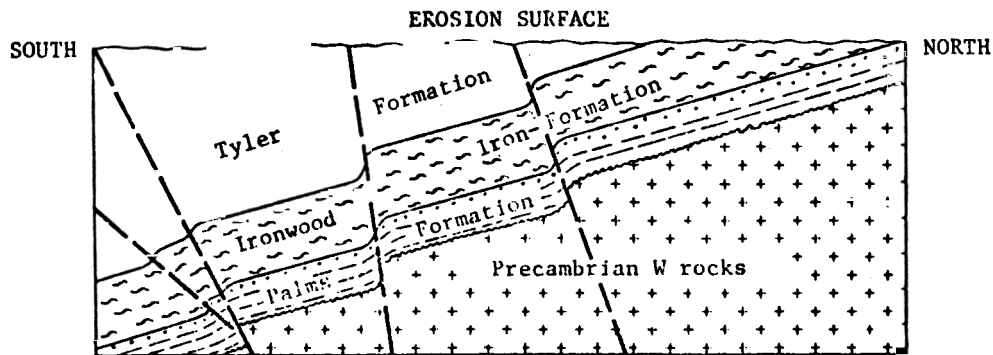
The relationship of the cleavage to the bedding suggests that there is an anticline to the north of here -- in the Lake Superior Syncline. Thus, these rocks appear to have been rotated as a block nearly 90° after the cleavage had developed. North of here the Keweenawan rocks dip more steeply than the Tyler formation (Schmidt & Hubbard, 1972), and the lavas flowed downhill from the north. This indicates that a block of rocks some 80 miles long and perhaps 10 miles wide was rotated as a unit during Keweenawan time (Hendrix, 1960), perhaps the result of a rift opening in the present site of Lake Superior.

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- Aldrich, H. R., 1929, The Geology of the Gogebic Iron Range of Wisconsin, Wis. Geol. Nat. Hist. Survey Bull. 71, 279 p.
- Alwyn, B. W., 1976, "Sedimentation of the Middle Precambrian Tyler Formation of North Central Wisconsin and Northwestern Michigan," Unpublished M.S. Thesis, Univ. of Minn.-Duluth, 175 p.
- Hendrix, T. E., 1960, "Structural History of the Eastern Gogebic Range Unpublished Ph.D. Thesis, Univ. of Wisconsin.
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Generalized diagram of the relationship of Precambrian rocks in the central Gogebic district



Hypothetical post-Penokean pre-Keweenaw cross-section on same surface as front of block diagram above

From Schmidt & Hubbard, 1972.