Wolf Hollow Field Trip, Geologic Background
by Kurt Hollocher

Wolf Hollow is a narrow valley carved by the Chaughtanoonda Creek into the steep rim of the Mohawk River channel. The valley of Wolf Hollow is located where it is because rocks were broken up along Hoffman's Fault, and so were more easily eroded there than most of the surrounding areas. In Figure 1, rocks on the east side of the fault are of the Ordovician Schenectady Formation shales and sandstones. On the west side the rocks are Ordovician Utica Shale (on top) and Trenton and Black River Group limestones, and Cambrian–Ordovician Beekmantown Group dolostone (on the bottom). So, different rocks are exposed on either side of the fault. Qhd labels a delta that was built into Glacial Lake Albany, at an elevation of about 480 feet. What does that mean in terms of fault offset and the layering of the rock strata?

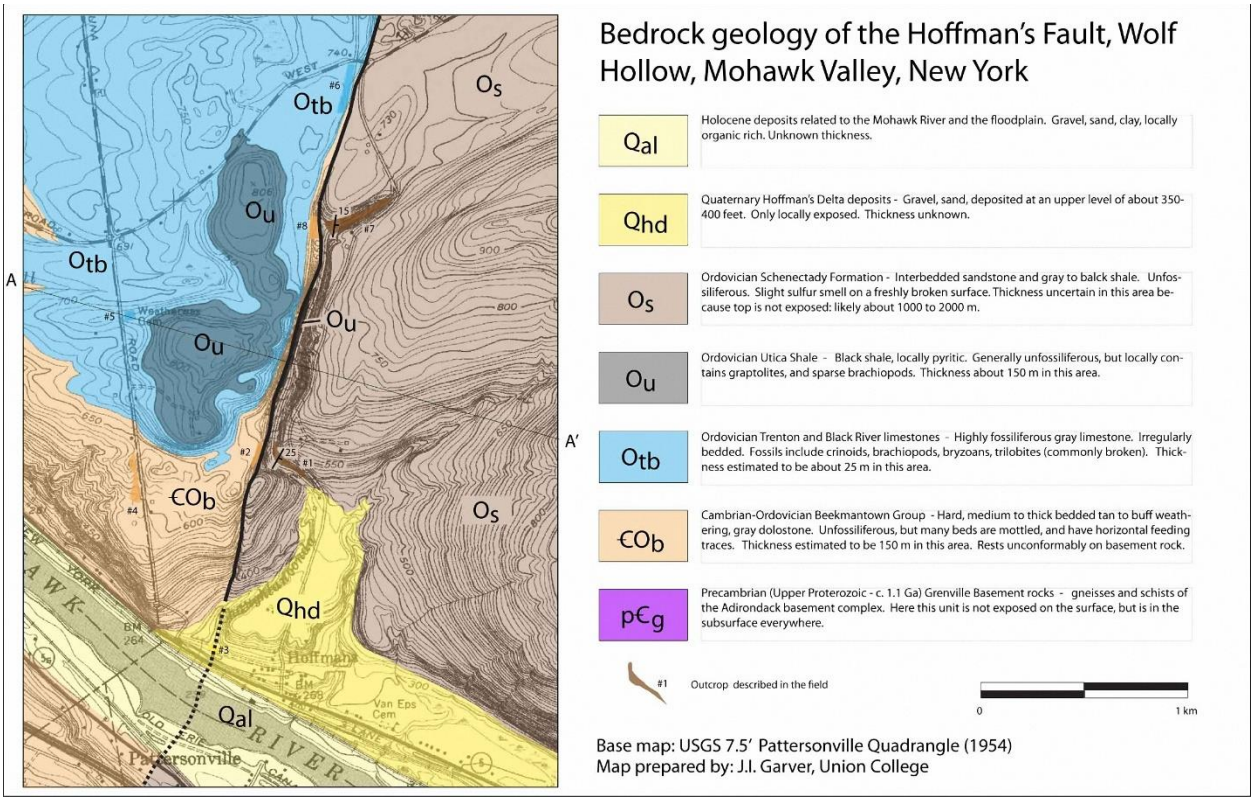

Figure 1. Geologic map and explanation of the Hoffman's Fault, Wolf Hollow area. From John I. Garver, Union College, http://minerva.union.edu/garverj/Regional_geology/Wolf_hollow.html.

Figure 2 shows a cross section across the Hoffman's Fault. The fault is a steeply-inclined normal fault, with rocks moved down on the east side relative to the west. The stratigraphic succession starts at the bottom with Precambrian metamorphic rocks ("Basement"), like those seen in the southern Adirondacks. Overlying that are Beekmantown Group dolostones, the Trenton and Black River Group limestones, the Utica Shale, and the Schenectady Formation sandstones and shales. Layer thicknesses are relatively well-known, based on thicknesses seen here and elsewhere in eastern New York. Based on this cross section, you can see that the vertical displacement on the fault is about 750 feet (about 230 meters), though estimates vary somewhat. Frictional resistance during fault movement caused the (then) young, soft, and flat-lying Schenectady Formation to fold upward into the plane of the fault. The tilt of the beds decreases with distance from the fault, easily visible in the road cuts*.

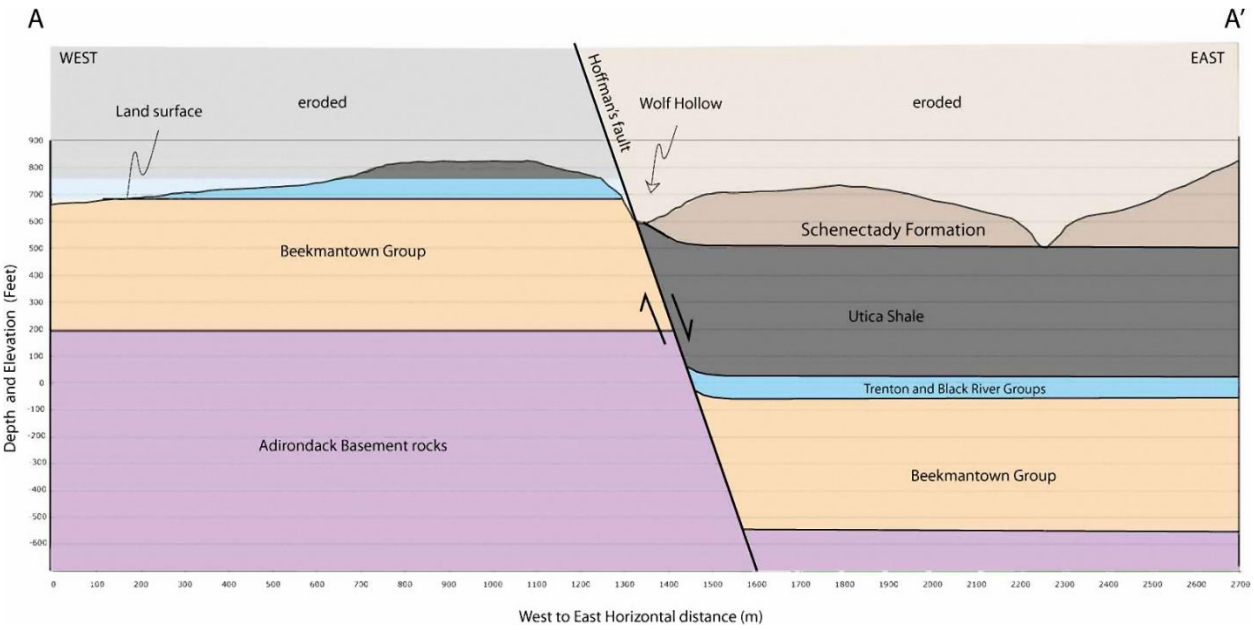

Figure 2. Vertical cross section across the Hoffman's Fault, showing stratigraphy seen here and inferred from elsewhere. See Figure 1 for the cross section line location. From John I. Garver, Union College, http://minerva.union.edu/garverj/Regional_geology/Wolf_hollow.html.

Hoffman's Fault is one of many N-NE–W-SW-trending faults in the region, that resulted from the down-warping of the eastern coast of proto-North America as it subducted beneath the Taconic volcanic arc during the Ordovician (about 450 million years ago). These faults cut rocks as young as Ordovician, but do not cut overlying Silurian and younger rocks. That means they formed in the Ordovician, and basically have not moved much or at all since then.

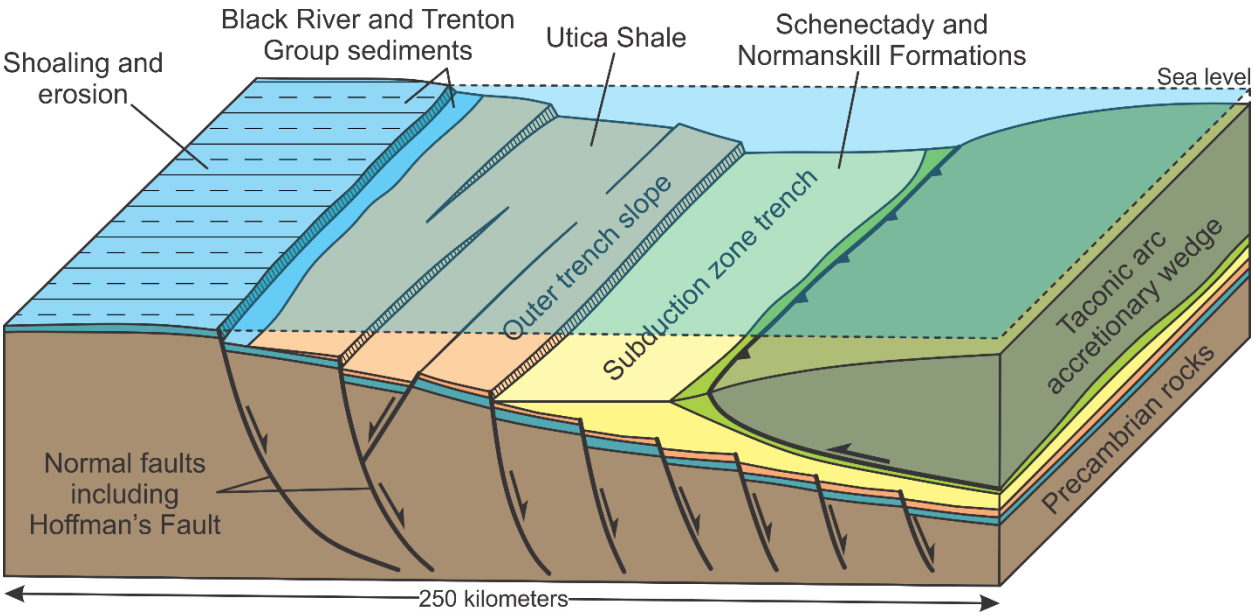

Figure 3. Interpreted environment in the Ordovician when Hoffman's and related faults last moved. As proto North America subducted beneath the advancing Taconic arc, stresses induced normal faulting. Modified after Bradley and Kusky (1986).

Reference: Bradley, D.C., and Kusky, T.M., 1986, Geologic evidence for rate of plate convergence during the Taconic arc–continent collision. Journal of Geology, v. 94, p. 667–681.

*This is the traditional interpretation of the steeply east-dipping Schenectady Formation beds along this fault. I was informed in 2023 that Wolf Hollow had been mapped in more detail by Ed Stander (SUNY Cobleskill). He interpreted the steep dips as being on the southeast limb of northeast-plunging anticlinal fold, one of a set of two. Here is his interpretation. These folds may be the result of fault spays that don't cut the surface.