

shale occur, but these are quite rare and very thin, and also rows of spheric or oblong and flattened concretions. Eight feet of the shales at the top of the beds are somewhat darker and harder than those below.

The Cashaqua beds are 32 feet thick in the exposure at the south shore cliffs and in the bed of Pike creek at North Evans. They extend in long flat outcrops in the bed and banks of Smoke's creek,  $\frac{1}{2}$  mile south of the upper electric railroad bridge at Windom, and are slightly exposed along the roadside on the hill above the school-house 1 mile south of Big Tree.

The average thickness of the formation on this quadrangle is 45 feet. The thickness increases toward the east and is 165 feet in the Genesee river gorge at Mt Morris and along Cashaqua creek above Sonyea; and at Naples, in Ontario county, it even attains 230 feet.

Nearly all of the northward flowing streams in the eastern part of Erie county and in Wyoming, Livingston and Ontario counties have excavated ravines in the Cashaqua shales, producing large and favorable exposures. Among the best of these are: the ravine of Murder creek at Griswold on the Erie Railroad 6 miles west of Attica; in the Oatka river valley in the vicinity of Wyoming; in the Genesee river gorge between Mt Morris and Smoky Hollow; along Cashaqua creek between Sonyea and Tuscarora; in the ravines along the sides of Conesus and Honeoye lakes and in the southern part of the Bristol valley and in Parrish gully and other ravines at Naples.

Fossils are fairly common in the shales and also in the concretions and they increase in frequency from the lower to the upper beds. The more abundant forms in this vicinity are:

the goniatites

*Probeloceras lutheri Clarke*

*G. cf. domanicense Holzapfel*

*Gephyroceras holzapfeli Clarke*

the lamellibranchs

*Lunulicardium pilosum Clarke*

*Buchiola retrostriata (v. Buch)*

*Pterochaenia fragilis (Hall)*

*B. lupina Clarke*

*P. elmensis Clarke*

*Paleoneilo petila Clarke*

the gastropod

*Loxonema noe Clarke*

*Rhinestreet black shale*

This shale consists of a heavy mass of black, bituminous, slaty shale, in which there are a few thin bands of dark bluish, rather