

Middle Devonian. Still farther east, along the Hudson River valley, the Catskill formation occupies the whole of the Upper Devonian interval." The beds show that the region of their depositions was invaded here and there at times by fresh waters from the bordering hills.

In the Catskill Mountain region the Catskill rocks are to a large extent the summit rocks and have a thickness there of 3000 feet. Marking them, as is usual, by their coarse sandstone character and red color, they extend southwestward into Pennsylvania, along the course of the Appalachian trough, from Port Jervis, N.Y., to Fulton County, and have a reported thickness, in this part of the state, of 4500 to 7000 feet; 3430 at Port Jervis, 4000 to 5300 in Monroe County, Pa., 7544 near Mauch Chunk, 6000 in Perry County, and 3900 in Fulton County. In Fulton County, Chemung fossils have been observed in the so-called Catskill beds by J. J. Stevenson, through the lower 900 feet, reducing the thickness of the so-called Catskills at that point to 3000 feet. West of the above-mentioned line, the reported thickness diminishes; in southwestern Bedford County, it being but 2000 feet, and only a few feet in western Somerset County.

Eastern New York and Pennsylvania continued to be for a long time a sea-border region, undergoing the subsidence required for thousands of feet of sea-shore deposits, because here lay the border of the Appalachian geosyncline.

The *Portage* group was early called the *Nunda* group, from this early name of the village of Portage, situated on the banks of the Genesee River, where the beds occur. The Genesee shale is finely displayed at the opening of the gorge of the Genesee at Mount Morris; and it also forms high cliffs above the Tully limestone along the borders of Cayuga and Seneca lakes. The concretions occurring in the rocks sometimes contain mineral oil, and a soft substance looking like spermaceti. The region of the Portage beds in New York is famous for its waterfalls.

On the Genesee River, the group includes, above the Genesee shale, (1) the *Cashagua shale*, and the *Gardeau shale* and sandstones, the *Naples* beds of J. M. Clarke; and (2) the Portage sandstones. The Portage beds of western Pennsylvania are so deeply buried that their thickness is unknown; the drillings for oil do not reach down to them.

The Ithaca group abounds in ripple-marks, mud-cracks, calcareous concretions, and cone-in-cone forms. It is referred by Hall to the Chemung series.

Prosser has deduced from the many drillings in western New York, and the observations of Hall, H. S. Williams, and others, the following section for the region not far west of the Genesee River, near Rochester:—

	Feet		Feet
Wolf Creek Conglomerate . . . . .	300	Salina ? (to 4000' d.) . . . . .	600
Chemung (to 1450' depth) . . . . .	1150	Niagara and Clinton . . . . .	250
Portage . . . . .	900	Medina . . . . .	1158
Genesee shale . . . . .	100	Hudson, Utica . . . . .	598
Hamilton (to 3200' d.) . . . . .	750	Trenton (to 6960' d.) . . . . .	954
Marcellus shale . . . . .	50	Calciferous ? (to Archæan ?) . . . . .	137
Corniferous . . . . .	} 150		
Lower Helderberg ? . . . . .			

In Pennsylvania, in Perry County, the Chemung is 3300' thick, and the Catskill 6000' (Claypole); but the latter contains in its lower third some Chemung fossils. In Columbia