

in their kinds. They cover a large part of southern and western New York. The layers bear the same evidences of shallow waters as the Portage, and are often cross-bedded from the sweep of the currents of probably the tidal ebb and flow. The thickness south of Cayuga Lake is stated at 1500 feet, and in Chautauqua County, bordering Lake Erie, 950 feet. At Panama, in this county, about a dozen miles from the western border of New York, the Chemung rock is a hard, quartzose "flat-pebble" conglomerate, its pebbles, which are mostly of quartz, being commonly flat. The rock near Panama stands up in bold bluffs and walls, with intersecting passages and isolated towers, making the place one of the so-called "Rock-cities" of western New York. The conglomerate is 200 to 300 feet below the top of the fossiliferous Chemung of that region. The rocks dip southward gently, and in the north-western counties of Pennsylvania are succeeded by the shales and sandstones of the Waverly group containing a different fauna.

The thickness of the group is greater over northern and central Pennsylvania, along the Appalachian area, becoming 2000 to 8000 feet; but, like the Portage, it diminishes rapidly westward, where it passes outside of this area.

The Upper Devonian is represented over the larger part of the Central Continental Interior by a "Black shale," a stratum 10 to 200 feet thick, carbonaceous, but not always black. At Burlington, Iowa, it includes some limestone. It indicates nearly uniform conditions of level over a great extent of surface, but with variations only between salt or brackish and fresh waters. Its fossils are mainly small Brachiopods, Ceraticarids, and Fishes.

The Catskill group — so named from the Catskill Mountains of eastern New York — consists of sandstones, often passing into conglomerates, with some shale. The beds are usually red, but occur also of greenish and other shades. They are rarely fossiliferous; and the few animal fossils found are those of Fishes, Eurypterids, and some fresh-water Lamellibranchs. A prevailing red color, and no marine fossils, are its accepted characteristics; but these are poor criteria for separation chronologically from the Chemung. Hall was the first to show that they were in part Chemung. H. S. Williams has recently referred the whole to the Upper and Middle Devonian, and speaks thus of its relation in position over the state of New York to the rocks of these periods: "In the Genesee section in western New York, the whole of Devonian time is recorded without any trace of the Catskill formation; it is neither above, below, nor within the Chemung. One hundred miles eastward, the section running through Cayuga Lake shows at the close of the Devonian, after the cessation of the Chemung fauna, a Catskill formation several hundred feet thick. Another hundred miles eastward, across Otsego County, the section contains (1) rocks of the Catskill formation for the upper third of the Upper Devonian; below these (2) a sparsely fossiliferous zone of Chemung — probably its lower part, and (3) a modified Ithaca fauna; then (4) the Oneonta formation, which is but a detached zone of the Catskill; next (5) a fauna intermediate between that of the Ithaca and the typical Hamilton, underlaid by (6) the Hamilton formation of the