

the "millstone grit" of Eaton. It was formerly much used for making the "Esopus millstones," so named from Esopus, an early name of Kingston; and at Ellenville, for glass-making. It is intersected by quartz veins; and mines of lead and zinc have been worked in it at Ellenville, Wurtsborough, and elsewhere, which have yielded remarkable geodes of quartz crystals, with crystals of lead ore (galena), sphalerite, chalcopyrite, and other minerals.

The *Medina sandstone*, where fullest developed in New York, includes, according to Hall, four divisions, as follows:—

(4) Red marl or shale and shaly sandstone, resembling No. 2, below; banded and spotted with red and green.

(3) Flagstone, — a gray, laminated quartzose sandstone, called "gray band."

(2) Argillaceous sandstone and shale, red, or mottled with red and gray.

(1) Greenish gray sandstone, graduating below into the Oneida conglomerate, the "gray band" of Eaton.

In the Genesee section (page 91), the strata 1 and 2 correspond to the Medina; 3, 4, 5, 6, to the Clinton group; and 7, 8, to the Niagara shales and limestone.

In Canada the Medina beds, besides existing in Ontario, occur south of the St. Lawrence, over a few areas east and northeast of Lake St. Peter.

The Oneida conglomerate disappears before reaching the southern border of Pennsylvania, and the passage from Hudson into the red Medina is imperceptible. Hudson fossils continue far up into the Medina in Bedford County. (*Rep. T 2, Penn. Surv.*, pp. 91 and 92, J. J. Stevenson.) This condition becomes more striking in southwest Virginia beyond the New River, where Hudson forms occur up to within 100' of the white Medina. (J. J. Stevenson, *Proc. Amer. Phil. Soc.*, xxiv., 85, 87, 94; and xxii., 142, 150.) A peculiarity of the Upper or white Medina in Pennsylvania and southward is, that exposure to atmosphere polishes it; all other sandstones there are roughened by exposure. (J. J. S.)

2. CLINTON GROUP. — This is the "Protean group" of the *N. Y. Annual Geological Reports* of 1836–1840. The sandstone of the Clinton epoch in New York is often quite hard; and much of it has the surface uneven from knobby and vermiform prominences, some of which are attributed to Fucoids.

(a) *Interior Continental basin*. — On the Genesee River, at the falls near Rochester, the Clinton group consists of: (1) 24' of *green shale*, of which the lower part is shaly sandstone and the upper part an *iron-ore* bed; (2) 14' of limestone, called *Pentamerus limestone*, from a characteristic fossil; (3) 24' of *green shale*; (4) 18½' of limestone, called the *Upper limestone*.

On the Niagara (see section, Fig. 738, page 540) there is shale 4', *without* the iron ore, overlaid by limestone 25', the limestone corresponding to the three upper divisions, and its upper 20' to the upper limestone. To the eastward, in Oneida, Herkimer, and Montgomery counties, the rock is 100'–200' thick, and includes no limestone, though partly calcareous. The group consists of shale and hard grit or sandstone, in two or more alternations, along with two beds of the iron ore. Near Canajoharie — which is not far from its eastern limit — the formation has a thickness of 50'. In Starkville, Herkimer County, the rock contains a bed of gypsum.

North of Lake Huron, the Clinton beds occur along the Manitoulin Islands, Drummond Island, and 20 miles to the westward.

(b) *Appalachian region*. — The relations of the Clinton of Pennsylvania and the country southward to that of central New York are not determined in detail. The rocks in Pennsylvania are shales, olive to almost black, with some sandstones and beds of calcareous iron ore. The series is persistent, northwestwardly, to the last exposures, almost at the easterly foot of the Alleghany Mountains. Its subdivisions are: (1) Reddish to olive shales, 100' to 700'; (2) iron sandstone, 5' to 50'; (3) shales, 200' to 675'; (4) iron sandstone, 10' to 20'; (5) shales with calcareous layers, 100'. The whole thickness is from 900' to 1000'. A commingling of Clinton and Niagara forms occurs in the upper