

Lake Ontario. East of the Hudson it occurs over large areas as part of the Taconic series described beyond. In the west-central portion of southern New York it is covered to a depth of 2000' or more by later formations.

The Utica shale is 15' to 35' thick at Glen's Falls, in New York; 250' in Montgomery County; 300' in Lewis County.

The Hudson River shales cover the region north of Lake Champlain, in Canada, reaching to Quebec, and northeastward to Montmorency and beyond. They also cover a small area near the center of the Trenton limestone region of the Ottawa basin. In New York they include shales and sandstones. They are the *Lorraine shales* of Jefferson County (the *Pulaski shales* of the New York Annual Reports), containing some thin beds of limestone. The thickness of the shales, in Schoharie County, N.Y., is 700'; in western Canada, 700'; in a boring at Utica, N.Y., 90', below 710' of Utica shale.

In Pennsylvania the Hudson shales (Matinal of Rogers, or his No. III) border the Trenton areas, and have in general great thickness.

In Ohio the Trenton, in the Cincinnati region, lies beneath 700' or so of beds of impure thin-bedded limestone and shale of the Hudson (Cincinnati) epoch; and to the north these shales are 500' to 1000' thick, and include at base 300' of Utica shales. The same beds are continued westward into Indiana, in the eastern part of which State the thickness is about 1650'. Of this, 500' to 600' are Trenton and Galena limestone; it is usually of gray to buff and white color, but in the northwestern part of the state, chocolate-brown.

South of the Ohio, in middle Kentucky, the Trenton, which includes the "Blue limestone" of Owen, is well represented by thick-bedded limestone, with some shaly seams; the beds have a small northward dip, toward the Cincinnati region and Lake Erie, along the area of the "Cincinnati anticline."

In the valley of east Tennessee, the Trenton includes the "Blue or Maclurea limestone" of Safford, and is 200' to 600' thick; and above this comes the "Nashville shale" of the Hudson epoch, which is partly calcareous (becoming increasingly so to the westward) and is about 2000' thick. In the Maclurea limestone occurs, as an interpolated bed, the clouded red limestone, affording the famous Tennessee marble; it is about 380' thick. In middle Tennessee the Trenton and Nashville strata are horizontal, and all is limestone, the later less pure; thickness about 450'. (Safford.)

The Galena or lead-bearing limestone, of Wisconsin and the adjoining States in the West, is 100' to 200' thick in northern Illinois and about 250' thick near Dubuque, Iowa; and the underlying Trenton 20' to 100'.

In Wisconsin and the adjoining part of Minnesota the Trenton limestone is 300' to 350' thick; the lower thinner part represents the Birdseye and Black River limestones of New York. The upper part is the Galena limestone. Although mostly a dolomite, it is not all so; in some parts of the lead region only the lower 18' to 25', called the Buff limestone, out of a thickness of 100' or more, is magnesian. The Buff limestone from the southern part of the town of Bristol afforded calcium carbonate 56.07 to magnesium carbonate 35.32. An associated blue limestone afforded 84.02 of the former to 5.33 of the latter; the rock of another bed, 97.92 of the former to 1.00 of the latter. (J. D. Whitney, T. C. Chamberlin.)

In Iowa, at Washington, a boring struck Hudson shales at 700', the Galena limestone at 800', the Trenton at 1020', and St. Peter's sandstone at 1100'; and below this, at 1230', the magnesian limestone.

In Minnesota, the Trenton, as it occurs near Minneapolis, consists of dolomitic limestone, more or less argillaceous, of a buff to a drab color, with intercalated shaly portions and blue shale at base. The thickness in the State is 15' to 70'. The Trenton in Missouri, according to Broadhead, has a probable thickness of 400'.

*c. In the Rocky Mountain region.*—The Calciferous period is represented probably by the Ute limestone in the Wasatch, 1000' to 2000' thick; it includes beds in the House