

known facts respecting copious brine springs of considerable density, are opposed to their existence in the Onondaga salt group of Enniskillen; and it is more than probable that a well sunk to the depth even of 1,000 feet would fail to tap salines commercially valuable.

It would inevitably lead to disappointment if deep borings were to be made in Enniskillen in the hope of obtaining rich brines, grounded only upon the success which has attended similar enterprises in the neighboring state. The recently discovered rich supplies of brine in Michigan are derived from rocks which do not appear in Western Canada, and which are far above the Hamilton shales. The highest rock in Western Canada belongs to the Portage group; and these shales and sandstones, although they have a thickness of 1,400 feet near lake Erie, occur but in limited area and thickness between lakes Erie and Huron. Above these lie the Chemung rocks, not known to be represented in Canada, without it is thought proper to consider the Portage and Chemung as one group, and its representatives in the small areas of the Portage found in Western Canada. Of the Subcarboniferous rock no trace has yet been found in the Western Province, nor is there any probability that the smallest fragment exists. The great uplift, with its subordinate depression, before referred to, as extending from lake St. Clair to lake Ontario, through London and the neighborhood of Hamilton, probably took place before the era of the Subcarboniferous rocks, and occasioned that symmetrical and independent carboniferous basis, which is so characteristic of the geology of Michigan.

As an independent basin it contains four groups of strata, according to Dr. Winchell: the first, or lower, 171 feet of grits and sandstone (the Marshall group); the second, 123 feet of shales and sandstone (the Napoleon group); the third, 184 feet of shales and marl, with limestone and gypsum, called the Michigan salt group; the fourth, the carboniferous limestone, 66 feet thick. This is followed by a sandstone, 105 feet thick; and then by coal measures, 123 feet thick. None of these rocks are present in Canada, and it is from them that the rich brines in Michigan are obtained.

"The following is a statement of the strata passed through in the salt wells of the Saginaw valley, grouped and named in accordance with the Geological Reports made to the governor, December 31st, 1860:—

1. Alluvial and drift materials, consisting of sand, clay, and boulders. feet 100
2. "Woodville sandstone," brown and coarse. 65
3. Coal measures, consisting of shales, with some sandstones, limestones, and coal. . . 130

4. "Parma sandstone," white and porous. . . . 115
5. Carboniferous limestone, often highly arenaceous. 75
6. "Michigan salt group," consisting of argillaceous, pyritous, and gypseous shales, their beds of arenaceous, and magnesian limestone and thick beds of gypsum. . . . 170
7. "Napoleon sandstone," light buff, coarse, . . 110

Total 765

"The foregoing table exhibits the average thickness of the strata in the vicinity of East Saginaw. From a point near the centre of the city, the rocks appear to dip both toward the north and the south; so that the total depth of wells four miles south is about 810 feet, while in the vicinity of Bay City the bottom of the Napoleon sandstone is found at a depth of 1,000 feet and over.

"The strata of the Michigan salt group outcrop toward the northeast at the mouth of Pigeon river and in Tawas Bay, on opposite shores of Saginaw Bay. It is an unexpected result, therefore, to find the saliferous basin depressed 200 feet deeper at points ten or fifteen miles nearer its margin. This local northern depression is filled by an extraordinary thickening of the shales of the coal measures. At the same time the underlying "Parma sandstone" is found charged with a brine of great purity, and of a density of 60° to 84° of the salometer. Persons engaged on the lower river, therefore, mistaking this saliferous sandstone for the one encountered at East Saginaw and vicinity, suspended their operations at this horizon; and up to the present time the manufacturers in the lower part of the valley have derived their supplies of brine from this source. It is only the result of a recent examination of specimens of the borings of these wells, and comparison of statements of well-borers, that this important conclusion has been fully decided upon; and we have the peculiar satisfaction of learning, while penning this article, that one well on the lower river, having been sunk to the depth of 916 feet, has just struck upon the true Napoleon sandstone, at the depth of 54 feet, in which a brine has been brought up *fully saturated*.

"It may not be uninteresting to observe that the Parma sandstone seems to be the equivalent of the carboniferous "conglomerate" of Ohio, which constitutes the reservoir of the brine supplying the wells of the Ohio and Kanawha rivers. It constitutes, moreover, the third or upper saliferous horizon known to exist in Michigan—that of the Onondaga salt group being the lowest. This recent discovery, moreover, discloses the probability that in the deeper portions of the general basin, the coal measures may be found similarly expanded in