

## AN ANCIENT RIVER.

rather more than two miles. Of these hills the lower 250 feet are composed of Medina shales, and over these there are the thin intercalated beds of Clinton dolomites and shales, surmounted by a still greater development of compact Niagara dolomites. The general altitude of the rocky boundaries of the valley is rather more than 500 feet above Lake Ontario (516 feet north of Dundas, and 510 feet south of Ancaster.)

After the escarpment closes to form a valley of about two miles in width, just beyond the limits of the city of Hamilton, it extends westward for six miles, but at Cope-town it becomes covered with drift, while on the southern side, at Ancaster, less than four miles distant, it abruptly ends. Westward of Copestown, on the northern side of the valley, the escarpment continues; but it is more or less covered with drift, through which there are occasional exposures of a rocky floor.

On the southern side of the valley, as just stated, the escarpment ends, and the country beyond consists of a large basin filled to an enormous depth with drift deposits, traversed by deep valleys.

The deeper portion of the valley, in which Dundas is situated, is separated from the lake by Burlington heights, a ridge of stratified gravel that rises 108 feet above the lake, being an old beach composed of Hudson river pebbles. Behind this ridge is the extensive Dundas marsh, and further up the valley is the town itself.

As we ascend the Dundas valley we find that the channel between the rocky walls of the Niagara limestone becomes filled with drift which rises in places to the summit of the escarpment itself, but which is traversed by deep ravines.

At the upper end of the Dundas valley proper the character of the country differs from that in the valley. There is a large basin, which may be defined approximately by drawing a line from Ancaster village to the Grand river on the west, thence along the hills southward of the Grand river to near Brantford, thence northward to the main line of the Great Western railway, and thence eastward from near Harrisburg to Copestown and the north side of the Dundas valley. Much of this basin is from 50 to 100 feet lower than the country outside of it, which is underlaid by an almost horizontal limestone floor, 500 feet or more above Lake Ontario, and covered with only a moderate thickness of drift.

But in this basin the drift is developed to an enormous extent, seen not only in the meses in the eastern portion which pass to Dundas valley, but also in the very deep

wells. Even the drift divide between the ravines (almost dry) opening to the Dundas valley and the Grand river, is much lower than the level country outside of this drift filled basin.

The depth of the drift in the basin is said to be very great. The elevation between the two systems of drainage is almost 440 feet above Lake Ontario, or 113 above Lake Erie, whilst the ravines and deep wells which seldom reach the rock, indicate an absence of hard rock in many places, at least, to a level below the surface of the latter lake. In the Dundas valley proper, the depth of drift is very great, and cannot be much less than 1000 feet, half of which is below the level of Lake Ontario; for near the margin of the narrower portions of the valley produced to Hamilton, the drift was found in a well to reach a depth of 227 feet below the lake on a bed of Medina shales, and in the center of the valley, (two miles wide), to a calculated (in rocks of the Hudson river period) depth of not less than 400 feet, which would be deep enough to drain Lake Huron, and which would accord with the soundings in the western end of the partially filled lake. This being the case the depth of drift in channels in the basin west of Ancaster, not more than seven miles distant, in all probability reach a similar depth.

Into the western portion of this basin I have found at least two preglacial rivers emptied, namely: the Upper Grand river, then entering the basin near Harrisburg, and Nith's river, emptying northeast of Brantford. From the south eastern corner of the basin the broad depression of the Grand river valley extends to Lake Erie.

The Grand River valley is characterized by a broad depression two miles or more in width, which has a lateral elevation of about 440 feet above Lake Ontario or 113 feet above Lake Erie, and still further by boundaries more than 160 feet above the latter lake. The drift-filled bed of the river at Brantford is only 66 feet above Lake Erie, at Seneca 37 feet, and at Cayuga (more than 15 miles from the mouth), it is down to the lake level itself. The lower portion of the river is through a broad marshy country. At Dunnville, a few miles from the lake, piles had to be driven to a great depth to get a foundation for an embankment across the river. The margins of the valley are underlaid by limestone (Niagara on one side and coniferous on the other), though the ravine valley is excavated out of the softer rocks of the Onondaga group.

In its meanderings the river along portions of its course in several places crosses small spurs of Onondaga shaly limestones, but this character in no place precludes the

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