

fact extended to the lake regions strengthened my opinion as to the correctness of the above hypothesis. Whilst the fluvial origin of Lake Ontario is apparent, yet the failure of demonstrating a drift filled outlet to the basin (which is 500 feet below the level of the sea), has forced me provisionally to accept the hypothesis that the basin was partly closed by oscillations of the region as strongly set forth in an able letter from Mr. G. K. Gilbert. As an evidence of local oscillation Mr. Gilbert has pointed out the Iron-quot Bay near Rochester was excavated to the depth of more than 70 feet, and two miles wide, by streams of postglacial or interglacial date and subsequently submerged to the above depth. From this his conclusion is that at the time of excavation of this flood-valley, the relative altitude of the locality and the rock sill over which Lake Ontario discharges differed from this present status by more than 70 feet. Corresponding perfectly with Iron-quot Bay is Burlington Bay at Hamilton with a depth of 78 feet, with a closed beach across its mouth. From this and other local features, the surface geology of the Dundas Valley (of which a large amount of information has been collected, but not yet worked out) would indicate a greater elevation, to the extent of more than 78 feet at the head than at the present outlet of the lakes.

Let us consider for a moment the physical effect that would be produced upon the stratification by subsidence of the north-eastern portion of Lake Ontario and the upper St. Lawrence. The dip of the rocks at the west end of Lake Ontario is about 23 feet in a mile, westward or south.

At the eastern end of the lake, I believe, it is somewhat greater. The deeper portions of the lake are more than 40 miles from its present outlet. Any local depression gradually extending northward from the deepest surroundings of the lake to even the extent of 25 feet in the mile, would lower the outlet by the St. Lawrence to an extent far greater than would be sufficient to drain the lakes, provided this change took place at a time of high continental elevation, thus producing a broad depressed valley, thus producing a broad depressed valley. We know that the valley of the lower St. Lawrence is submerged to the depth of at least nearly 1200 feet.

The rocky boundaries of the region could scarcely more than indicate this change of level, as the dip of the rocks would pass from

the condition of 25 feet in the mile or less to almost absolute horizontality, and we have no measure of comparison. If, however, the elevations took place to the southward to a greater extent than to the southward, such as might be occasioned by a change of the center of gravity of the earth, then the region to the southward of the lakes might be relatively sufficiently lowered as to permit the drainage to pass out by either the Mohawk or Seneca Lake valleys which, evidently, during some portions of the sea age, discharged waters from the expanded basin of the lake.

The local oscillations would also greatly aid in the explanation of the closing of the outlets of the Upper Lakes which would be the most satisfactory if we could establish the greater northern elevation of the lakes over the southern. With these remarks I will close.

The present paper is exceedingly unsatisfactory, owing to the fragmentary character of the facts that have been observed, and even only a portion of them have been worked out.

A word of tribute must be paid to those whose works have paved the way to the present study. General Warren, in his discovery of the former great channels of the drainage of the Winnipeg basin which concerns so large a portion of the continent, should fairly be placed as the father of Fluvial Geology.

The records collected by and under the supervision of the Directors of the Geological Surveys of Ohio and Pennsylvania—Professors Newberry and Lesley, and those of Dr. Sierré must have been of the greatest value in working out this subject.

To Mr. Croil belongs particular praise for working out the difficult problem of the Upper Allegheny into Lake Erie, and as his work, through the medium of the distinguished Director of the Pennsylvania survey led me to extend my studies beyond the western extremity of Lake Ontario and the Dundas Valley, so, I hope, that this fragmentary paper may assist in giving prominence to the difficult subject of Fluvial Geology, and correct what errors of observation and deduction which occur in the pioneering work of a department of science now almost unrolled, and yet one more than any other, though imitated by others, explains the surface features of the lake regions of the continent.