

and swampy taste due to the vegetable acids usually produced in such situations.

From the origin or birth of our water-ways we now proceed to consider their *history* and development. It has been stated above that rivers have their periods of growth, maturity and old age. How, we may now ask, are we to distinguish between a young and a mature or old river? Well a stream is young, in the sense which is here implied, when it still has the greater part of its work before it, that work being the making and deepening of its channel; it is old if that work is nearly done. Young rivers are usually swift, broken by rapids and falls, with their channels narrow and often bordered by rocky bluffs; old rivers are characterized by broad and open valleys, moderately flowing currents, with numerous islands, and more or less extensive flood grounds. Naturally their course will at first be determined by the position of the divides and the steepness of the slopes or watersheds; but if, with the aid of a good map, we try to trace them out, we are soon struck by the fact that while the minor streams evidently flow off, like rain on a roof, along existing slopes, or occupy valleys between enclosing hills, the larger ones in many instances cut directly across the latter as though they had been but little influenced by the irregularities of the present surface. Thus one of the principal tributaries of the St. John, viz., the St. Francis, starts from Lake St. Francis, hardly ten miles distant from the great St. Lawrence, and on the *northern* side of the great divide or "Height of Land" separating the Province of Quebec from that of New Brunswick, and yet, instead of emptying, as one would expect, into that river, cuts through a high range of hills to join the St. John, and then the combined waters of these and other tributary streams, still apparently unaffected by the obstacles in their way, turning southward traverse at least four other great axes of elevation to discharge into the Bay of Fundy. Only one explanation of this anomaly, shared with the St. John by the St. Croix and the Magagaudavic, as well as by the Hudson and the Potomac, is that the rivers are, in part at least, *older than the hills*; that these have risen athwart their path, but that, like men, having once "gotten into a groove," they could not well get out of it, and so, as the hills rose, have simply cut their grooves more and more deeply. That they are still at this work shows that they are, in part at least, still *young*.

To make this and some other points in connec-

tion with our rivers more clear, it is now necessary to say that at a period but little, if at all antecedent, to man's first appearance upon the earth—a period known to geologists as the Glacial Period—all this portion of America was, as generally believed, in a condition similar to that of Greenland to-day, *i. e.*, deeply buried beneath a continental or semi-continental glacier, even our highest hills being covered by hundreds, if not thousands of feet, of snow and ice. This great ice mass, too, was, as in the case of Greenland, "on the move," and therefore, as well exhibited both in that country and in Switzerland, in a condition to deeply abrade the surface on which it rested, ploughing deeply wherever the conditions were favorable, breaking off projected ledges, taking large quantities of rock material into its mass, transporting this to considerable distances, or pushing it in front of its advancing foot, there to remain, when the glacier finally melted away. Such accumulations of ice-transported rock material are in Switzerland, known as "*moraines*," and, as will be shown in a later chapter, are common over many parts of New Brunswick and Nova Scotia. Moreover, when the ice, through climatic changes, began to melt, the first formed streams, owing to the complete burial of the hills and valleys below, would be determined in their course, not by the latter, but by the ice-slopes above. Thus as ridges began to protrude, streams, fed by the melting ice, would have no difficulty in crossing them, at the same time determining a groove or "water-gap," which ever after they must follow. This is the explanation of the anomaly referred to above, and many of our rivers, or parts of them, are of glacial origin, produced when the land stood higher than now, and when, as a result of such elevation, both water and ice were far more effective agents of sculpture and removal than they ever since have been. But while many of our rivers, or some portions of them, were thus excavated, channels formed at that time, or previously existing, were in many instances obliterated, as the result of being completely filled up by the debris of the glaciers, thus forcing the rivers at a later period to carve for themselves entirely new ones. Finally, as the land during the period of elevation was not only higher, but more extended than now, coastal regions which are now submerged being then a part of the dry land, the mouths of rivers emptying into the sea would have their mouths far outside of their present position, they and their former channels, in some instances for hundreds of miles, becoming buried or "drowned"