

of the rocks themselves. If they consist of limestone, the rains may wash down the finer particles from many places; but wherever soil remains it will still retain nearly the same composition as at first, and will be little impaired in fertility by the action of the rains. Hence the fine sweet herbage which clothes our limestone-hills, and makes them so grateful to the pasturing flocks. Or if hills or table-lands of red marl\* form the higher country, portions may be washed down without materially affecting the quality of what remains. Let a fresh portion of the rock crumble, and things are again as they were before. A new soil is produced, equally fertile with that which has been washed away, and thus the fertility natural to the rock will be permanently maintained.

It is different, however, in the case of sandstone rocks, such as those of the coal-fields of New Brunswick. When such rocks crumble they form soils more or less sandy, according to the proportion of fine clay which has been originally contained in the materials from which the rock was formed. Now, the action of heavy rains upon such a soil is not to carry it away bodily, as in the case of the limestone or of the fine red marl, but to wash out the fine clayey particles, and carry them down to lower levels. Thus on the uplands the sandy soils become every day more sandy and of less value, while, in the direction of the drainage, they become, on the other hand, constantly more tenacious and productive.

Thus the amount of influence exercised by physical drainage is itself limited, and determined by the chemical composition of the rocks of which the country consists.

5th. That the passage of rivers or of sea-arms across a poor country, after it has previously traversed a richer geological region, is sure, to a greater or less extent, to modify—to increase, in fact, the value of the surface in the line of its course. This is seen, as I have pointed out, on the St. John river, and at the head of the Bay of Fundy, and is confirmed by observations made by myself and others in nearly all parts of the world.

6th. That partial elevations of the land at successive periods will aid other physical causes in establishing such differences, often, as in New Brunswick, covering with more fertile land the surface which has been most recently raised from beneath the waters of seas or lakes. It is conceivable, however, that in other conditions the very converse may take place.

These practical results are drawn directly from the map before us. Of course they do not indicate or exhaust all the causes by which modifications are introduced into the agricultural indications of

\* Such as is represented in our sections by (3).