

with their associated marine strata, may contain. Sir Charles anticipates that the chronological results, derived from such sources, will be in harmony with the conclusions to which botanical and zoological considerations alone might lead us, and that the lapse of years will be found to be so vast as to have an important bearing on our reasonings in every department of geological science.

A question may be raised, how far the co-operation of the sea in the deposition of the Carboniferous Series might accelerate the process above considered. The Lecturer conceives that the intervention of the sea would not afford such favorable conditions for the speedy accumulation of a large body of sediment within a limited area, as would be obtained by the hypothesis before stated, namely, that of a great river entering a bay in which the waves, currents, and tides of the ocean should exert only a moderate degree of denuding and dispersing power.

An eminent writer, when criticising, in 1830, Sir Charles Lyell's work on the adequacy of existing causes, was at pains to assure his readers, that while he questioned the soundness of the doctrine he by no means grudged any one the appropriation of as much as he pleased of that "least valuable of all things, past time." But Sir Charles believes, notwithstanding the admission so often made in the abstract of the indefinite extent of past time, that there is, practically speaking, a rooted and perhaps unconscious reluctance, on the part of most geologists, to follow out to their legitimate consequences the proofs, daily increasing in number, of this immensity of time. It would therefore be of no small moment could we obtain even an approach to some positive measure of the number of centuries which any great operation of nature such as the accumulation of a delta or fluvial deposit of great magnitude may require, in as much as our conceptions of the energy of aqueous or igneous causes, or of the powers of vitality in any given geological period must depend on the quantity of time assigned for their development.

Thus, for example, geologists will not deny that a vertical subsidence of three miles took place gradually at the South Joggins, during the carboniferous epoch, the lowest beds of the coal of Nova Scotia like the middle and uppermost consisting of shallow-water beds. If then this depression was brought about in the course of three hundred and seventy-five thousand years, it did not exceed the rate of four feet in a century, resembling that now experienced in certain countries where, whether the movement be upward or downward, it is quite insensible to the inhabitants, and only known by scientific inquiry. If, on the other hand, it was brought about in two millions of years according to the other standard before alluded to, the rate would be only six inches in a century. But the same movement taking place in an upward direction would be sufficient to uplift a portion of the earth's crust to the height of Mont Blanc or to a vertical elevation of three miles above the level of the sea. In like manner, if a large shoal be rising, or attempting to rise, in mid-ocean at the rate of six inches or even four feet in a hundred years, the waves may grind down to mud and sand and readily sweep away the rocks so upraised as fast as they come within the denuding action of the waves. A mass having a vertical thickness of three miles might thus be stripped off in the course of ages, and inferior rocks laid bare. So in regard to volcanic agency a certain quantity of lava is poured out annually upon the surface, or is injected into the earth's crust below the surface, and great metamorphic changes resulting from subterranean heat accompany the injection. Whether each of these effects be multiplied by fifty thousand, or by half a million or by two million of years, may entirely decide the question whether we shall or shall not be compelled to abandon the doctrine of paroxysmal violence in ancient as contrasted with modern times. Were we hastily to take for

granted the paroxysmal intensity of the forces above alluded to organic and inorganic, while the ordinary course of nature may of itself afford the requisite amount of aqueous, igneous, and vital force, (if multiplied by a sufficient number of centuries,) we might find ourselves embarrassed by the possession of twice as much mechanical force and vital energy as we require for the purposes of geological interpretation.—*Sill. Jour.*

### The Northern Railway.

The conveyance of a party of gentlemen from Toronto to Bradford, by a Special Train, on Wednesday, the 6th July, at the instance of the Chief Engineer and the Superintendent of this line, is an event which we chronicle with particular pleasure, and some degree of pride. It is indeed a matter of no small moment to Western Canada, and especially to Toronto, that it is now possible to pass from Lake Ontario at a speed exceeding forty miles an hour, over an elevation of more than 730 feet, to the landing place on Lake Simcoe, in direct, though not yet available communication with the world of waters to the west.

It is, however, in relation to the local advantages which the Northern Railway confers upon the fertile country through which it passes, that we are as yet enabled to speak with that certainty which actual observation and experience permit. Many portions of the extensive country traversed by the line, cannot fail to impress the passing stranger with a well grounded conviction of its admirable adaptation to support a dense and independent population. Of the wild beauty of mountain scenery Western Canada itself, can scarcely boast, and certainly none is to be found on the Northern line, as far as Bradford; but of undulating plains of extraordinary fertility, a teeming soil and a healthy, industrious population, of these lesser, but more desirable attractions, a rich share is strewn around its path.

The part of the Northern Line so rapidly passed over by the Express Train, on July 6th, is 42 miles in length, and connects Lake Ontario with Lake Simcoe. The Station on the last named Lake is very fortunately situated upon a deep and navigable river which empties itself into the Lake, about seven miles from the substantial railway bridge, recently thrown across it. Above the bridge the river is navigable for many miles, and thus establishes an easy and rapid communication between a very extensive and fertile inland country, and the only port accessible throughout the year, on the North Shore of Lake Ontario.

Although the line has been opened for a very few weeks, yet it seems to have given already an extraordinary impetus to the growth of the villages through which it passes. The present interest attached to the northern line, is not confined to the fact that it is the first railway which has been opened for so long a distance in Western Canada, or that the speed attained by a Special Train, nearly equalled the usual rapidity of the English Express trains; it is something to know that the *matériel* of the line, the Locomotive and Cars, are in themselves, admirable illustrations of the rapid progress we are making in the mechanical arts. Canadian White Oak and Bird's Eye Maple, give a lightness and brilliancy to the First Class Passenger Cars, which we have