

### Geology of Western Canada.

In the August number of this Journal we published a Geological Map of a considerable portion of Western Canada, by W. E. Logan, Esq., F.R.S. & G.S., Provincial Geologist. We now propose to furnish monthly abstracts of those portions of the Geological Reports which describe the physical structure of the country comprehended within the limits of the Map. We are induced to adopt this method of disseminating information respecting the Geology of Canada, not only on account of its intrinsic value, but also because it is a matter of extreme difficulty to meet with copies of the earlier Reports, in consequence of the destruction of the reserve during those disastrous conflagrations which destroyed the Parliament Buildings at Montreal and Quebec.

*Abstract of the Provincial Geologist's Reports, dated Montreal, April 28, 1844.*

#### WESTERN DIVISION.—PRIMARY AND METAMORPHIC ROCKS.

In availing myself of the labours of the American Geologists to illustrate the general relations of the rock formations of the Province, it will be convenient to divide the subject into two parts, and drawing a line along the Hudson River and Lake Champlain to Missisquoi Bay and thence to Quebec, to consider the region to the west of this line separately from that on the south side of the Saint Lawrence to the east, there being certain conditions in the one that do not prevail in the other.

#### WESTERN DIVISION.

The Western Division, as connected with the Geology of Canada, may be described as a gigantic trough of fossiliferous strata, conformable from the summit of the coal to the bottom of the very lowest formations containing organic remains, with a transverse axis reaching from the Wisconsin River and Green Bay in Lake Michigan to the neighbourhood of Washington, a distance of nearly seven hundred miles; and a longitudinal one extending from Quebec in a south-westerly direction, to some point, with which I am unacquainted, beyond the Tennessee River in Alabama.\* Contained within this vast trough and resulting from gentle undulations in the strata, giving origin to broad anticlinal forms, there are three important subordinate basins, in the centre of each of which spreads out an enormous coal-field. One of these extends in length from the County of Logan on the southern borders of Kentucky, in a north-westerly direction to the Rock River in Illinois, where it falls into the Mississippi, a distance of three hundred and sixty miles, and in breadth from the mouth of the Missouri to the County of Tippecanoe, on the Wabash in Indiana, two hundred miles. Presenting an oval form intersected by the River Illinois, Wabash and Ohio, and bounded by the Mississippi, which sweeps along nearly the whole of its western margin, this coal-field covers an area of 55,000 square miles. The second occupies the heart of the State of Michigan, and reaching 100 miles in an east and west direction from within thirteen leagues of the Lake of that name to Saginaw Bay in Lake Huron, and 150 miles in a north and south line from the neighbourhood of the Rivers Manistee and Ausable, to the source of the Grand River near Jackson, on the road between Detroit and St. Joseph, it exhibits an irregular pentagonal shape and comprises

a superficies of 12,000 square miles. The third carboniferous area stretches longitudinally about 600 miles in a north-easterly course from the state of Tennessee to the north-eastern corner of Pennsylvania, where many outlying patches belong to it, and 170 miles transversely from the north branch of the Potomac in Maryland, to the south-eastern corner of Summit County in Ohio, just twelve leagues south of Cleveland on Lake Erie. It possesses a sinuous subrhomboidal form and spreading over a surface somewhat larger than the first named coal-field, may comprise about 60,000 square miles. The Ohio and its tributaries unwater nearly the whole of it, and the main trunk of this great river serpentine through the centre of the region for about 400 miles of the upper part of its course. The Susquehanna and its tributaries intersect the north-eastern extremity of the deposit, and the vallies of denudation in which these waters flow, assisting the effect of a series of nearly equidistant undulations in the strata, there break its continuity into the outliers alluded to, which generally rest on sinclinal mountain tops, in the interrupted prolongation of a number of narrow subsidiary troughs resulting from the undulation in question, and giving an irregular and deeply indented contour to the outcrop of the main body of the coal. The chief part of the outliers, as well as the main body of the deposit, and also the other two great coal-fields described, yield fuel of the bituminous quality; but to the eastward of the Susquehanna, there are three large outliers almost sufficiently important to deserve the designation of another coal-field, in which the fuel contained is of the anthracitic kind.

The undulations which have been mentioned, constitute an important feature in the structure of the country between the St. Lawrence and the Atlantic. Their ridges or anticlinal axes preserving a remarkable degree of parallelism, have been traced for vast distances, ranging in a sinuous south-westerly course from Lower Canada to Alabama. Crossing them from north-west to south-east, those farthest from the ocean are broad and gentle, but they in succession become more acute and prominent; and as they do so the dips on the north-west side of the axes increase in inclination in a more rapid ratio than those on the south-east, giving to the undulations the form of waves driven before a gale, until at length the former assume a perpendicular attitude and even present an inversion of the strata.

It is where the flexures reach the Apalachian chain of mountains that the phenomena of these overturn dips are exhibited, and there the undulations, becoming identified with the ridges and vallies of the chain, afford an explanation of the structure of this great range of highlands. The disturbances which have given origin to these mountains, as they affect the coal measures, must, of course, take their date subsequent to the carboniferous era: but, as may be gathered from what has been said, it is only on the south-east side of the third coal-field that the measures are violently corrugated and fractured. The north-west outcrop exhibits a comparatively quiescent condition, and it would appear from the regular contour of the Illinois and Michigan deposits, that the disturbing forces had entirely died away before reaching them. It does not seem improbable, however, that the broad low anticlinal arch which separates these two from the other, may have some relation to the expiring effort of those forces, for although its axis cannot be called precisely parallel to the Apalachian undula-

\* See the geological Map of the Middle and Western States, lately published by James Hall, Esq., one of the State Geologists of New York.

\* See Professor H. D. Rogers' State Reports on the Geology of Pennsylvania.