Appendix (W.) 27th January.

western course on the north-western bank, and over the face of which various tributaries of the great river are successively precipitated in rapids and cascades, that, at once cutting deep into a thick and wide spreading deposit of an argillaceous character, (supposed from the remains of marine shells with which it is associated, to be of the most recent tertiary age,) in many places, expose the solid stratified rocks buried beneath. On the Maskinongé, the syenitic range is about twelve miles from the St. Lawrence; on the Achigan about twenty; and it strikes the Rivière du Nord about half a mile to the south of the village of St. Jerome. Following this stream down, the primary rocks, which are close on its northern bank, gradually assume a course with less of southing in it until they reach Lachute Mills, where their direction becomes nearly due west.

Along this line from Cape Tourment to Lachute, the outcrop of the limestone does not in all cases come quite up to the primary rocks. There is occasionally a space left between them for the calciferous sandstone on which it rests; and along the Rivière du Nord this rock, capped by the limestone, is seen in several places in a well defined escarpment about half a mile from the syenitic range, dipping southward at an angle of six degrees, which is probably one or two more than the average dip along the whole line of strike from the neighbourhood of Quebec.

The distance from Lachute to the exit of Lake Champlain in a straight south-east line across the upper end of the Island of Montreal is about fifty miles; and from what has been said, it would appear that the limestone under examination, from this line to the north-east constitutes a shallow trough, which in the neighbourhood of Montreal is of the breadth specified, and which gradually tapering to a point, terminates at Cape Tourment, a distance of 180 miles down the St. Lawrence, which flows through the middle of it the whole way. Whether any superior rock rests upon this formation in the district described, I am not prepared to say; but from the abundant presence of limestone in the Island of Montreal, which occupies the very centre of the basin, if any does exist (and the position of a conglomerate on the Island of St. Helens renders it not unlikely) it will probably be of small extent.

Following the limestone formation to the westward, the basin which has been mentioned, after passing the line up to which it has been brought, splits into two parts against an extensive tract of primary country in the State of New York, rising up between Lake Champlain and the lower end of Lake Ontario, and passing into Canada at the Thousand Islands. Of these divisions, one arm comprehends the calcareous rock already spoken of as existing along Lake Champlain, and the other constitutes a trough, a few miles within the southern rim of which runs the St. Lawrence from the Thousand Islands to Lake St. Francis; while its northern outcrop, bordering on the Ottawa, rests upon a continuation of the syenitic range of rocks described, which, proceeding from Lachute, first touch this river at Grenville, and keep on its northern bank the whole way to the Township of Hull, with the exception of one point in the Township of Alfred, where the river making an elbow to the north, has the primary rocks on both sides. Pursuing the Ottawa against the stream, the river makes a considerable bend to the southward above the point where it thunders down the Chaudières at Bytown (a cataract inferior in importance only to Niagara,) and thus in Hull the limestone has a breadth of about five miles on the north of the river. But how much further up the stream the formation extends I have not yet ascertained, though, I believe, it is known to reach the neighbourhood of the Lac des Chats. From the Rapides des Chats to Brockville, the distance in a straight line is about seventy miles, and about ten miles to the westward of this line, the basset edge of the western extremity of the trough under description, gently rises up to rest upon the eastern side of a great promontory of syenitic country coming from the North to connect the vast primary regions of Canada, by the very narrow isthmus of the Thousand Islands, with those which spread out like a huge peninsula in New York.

Between these primary rocks and the southern outcrop of the limestone, the calciferous sandstone assuming a very silicious character, is largely developed; but on the northern side of the trough I did not any where detect it coming to the surface, though the limestone was in no place seen to approach the primary rocks so near as to determine its absence, and the lowest calcareous beds always possessed so much of an arenaceous mixture as to deteriorate the quality of the stone for the purpose of making lime. On the western side of the trough the sandstone with the limestone resting on it, is visible, among other places, at the Upper Narrows on Rideau Lake, dipping a little to the north of east at an angle of four degrees.

On the western side of the syenitic promontory which has been mentioned, the sandstone appears to thin down and die away altogether, and the limestone, which after passing round from the Hudson River by the valley of the Mohawk River and Trenton Falls, comes into Canada by Howe and Wolfe Islands, is seen at Cedar Island, in the vicinity of Kingston, to rest immediately on the syenite.

Continuing to trace this formation westward, its northern boundary from the lower extremity of Howe Island has a strike to the W. N. W., which carries it to the iron works in the Townships of Madoc and Marmora, where, cut out into promontories, peninsulas, and outlying islands, it is embossed upon the primary rocks below, and resting on which unconformably at so small an angle that without much difficulty, it is impracticable to estimate what the average dip may be, it horizontally fills up the undulations and cavities in their surface. On closer examination it will probably be found that a similar fringe garnishes the outcrop of the deposit the whole way from the Thousand Islands, not only in the direction of Marmora, but also in that of the Lac des Chats. The top of the formation is said to strike into Canada at Newcastle, on Lake Ontario, and if such be the case, its breadth to Marmora may be taken at above thirty miles.

My information as to the development of this calcareous band farther west is not very precise, but in its progress in that direction it is known to come upon the shores of Lake Simcoe, and to strike those of Lake Huron in Nottawasaga Bay. From this, taking a more northerly course, it constitutes the south-west boundary of Georgian Bay, forming Cabot's Head. It then gains the Manitoulin and Drummond Islands, where it has been described by Dr. Bigsby, and thence reaching St. Joseph's Island, the formation terminates in Canada.

The important figure which the formation thus followed will make on the map of Canadian Geology may be estimated, when it is stated, that in this Province it is in all probability the uppermost solid rock under not much less than 30,000 square miles of its surface, thus constituting nearly one half of that which is likely to engage the early attention of the Survey. It abounds in excellent building materials, and its quality in many places is sufficiently hard to take a

Appendix (W.) 27th January.