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REPORT  
OF AN EXAMINATION OF THE  
COUNTRY BETWEEN LAKES TEMISCAMANG AND  
ABBITIBBE.

BY  
MR. WALTER McOUAT;

ADDRESSED TO  
ALFRED R. C. SELWYN, ESQ., F.G.S.,  
DIRECTOR OF THE GEOLOGICAL SURVEY OF CANADA.

MONTREAL, May, 1873.

Previous explo-  
ration.

Instructions.

SIR,—In accordance with your directions, I was engaged during the past season in making a geological examination of a portion of the country on the Ottawa to the northward and eastward of Lake Temiscamang. The country bordering the Ottawa River, as far as the head of this lake, was explored many years ago by Sir W. E. Logan; and in 1870 and 1871, exploratory traverses were made, in the former year by Mr. Richardson, and in the latter year by myself, across the country in a north-westerly direction from Lake St. John, on the Saguenay, as far as Lake Mistassini. Between the latter lake and the head of Lake Temiscamang, and extending northward to Hudson's Bay, there is a large area, of the geological character of which almost nothing was known. I was directed to turn my attention to this region, with a view of determining, as far as possible, the boundaries of the principal rock formations; a special interest having recently been given to it by the discovery in 1870, by Mr. Richardson of the Geological Survey, of a series of crystalline schists, with serpentine and conglomerates, occurring to the south of Lake Mistassini, and having a north-east and south-west strike. These rocks possess the double interest of containing important deposits of copper ore, and of having furnished a fossil coral. It was therefore part of my instructions to endeavour to ascertain how far they extend to the westward, and if possible, what may be their relation to the Huronian rocks so extensively exposed along the north shores of Lakes Huron and Superior.

As it would not be possible to make even the most cursory examination of so extensive an area in one season, it was understood that, in conducting the work of the first season, I should take advantage of whatever oppor-

tunities I should have when on the ground, to obtain such information as would enable me to make arrangements for conducting, to the greatest advantage, the operations of succeeding seasons. The present Report, therefore, on the work of the first season, is to be regarded as a Report of Progress, and will not be expected to give anything like the amount of information in regard to the region in question, which may be looked for after the completion of a more comprehensive plan of exploration, even though that should extend only over one additional season.

I have here to make the usual acknowledgment of indebtedness to the officers of the Hudson's Bay Company, with many of whom I was necessarily brought into contact. To Charles Stuart, Esq., of Temiscamang, and Mr. George Burgess, of Abbitippe, my special thanks are due for aid rendered in many ways, and for the readiness with which they furnished needful information. Acknowledgment of aid.

I was assisted during the whole of the season by Mr. John McOuat, and until the end of August, by Mr. Herbert L. Reddy, of this city, both of which gentlemen are at present students in McGill University. Assistants.

In making arrangements for the work of the season upon which I have now to report, my original intention was to begin at Grand Lake on the Ottawa, proceeding thither by way of the Ottawa and its tributary the Du Moine, and with this intention I set out from Montreal. It was subsequently decided, however, that it would be a better plan to follow the Ottawa river all the way to Lake Temiscamang, and to make that our base of operations. By doing so I would have the advantage of setting out from a district which had been previously examined and reported upon by Sir W. E. Logan. There was also reason to believe that the latter lake would be much more easily reached than Grand Lake. Plan of operations.

This point settled, my plan was to get the supplies for the whole season up the Ottawa as rapidly as possible, and having, with the permission of the officer in charge, deposited them in the store of the Hudson's Bay Co., at Fort Temiscamang, to make excursions of a month or six weeks duration into the country to be examined, returning at the end of each trip for the supplies required for the next one. I regret to be obliged to report, however, that in carrying out this plan, serious delay was occasioned, and additional expense incurred, by unexpected obstacles, arising chiefly from the fact that it was found to be almost impossible to engage suitable men as *voyageurs*. The only practicable mode of travelling in the unexplored regions of Canada, as is well known, is by following the water, and using light birch-bark canoes, manned by skilful *voyageurs*, and it is of course of the utmost importance that the latter be thoroughly experienced and trustworthy. This is especially true when, as in our case, very light canoes are used, so that only two men are required to manage them. In this case, if a single man in a party be in any way Unexpected obstacles causing serious delay and additional expense.

Employment  
of Indians.

deficient, the whole force is more or less crippled. It is usual to employ Indians for this work, but these people, though unsurpassed in point of skill and endurance when employed only for a short time, dislike long continued employment; and are, moreover, liable at any time to become possessed by some unaccountable whim or fancy, and, forgetful alike of their own interests and those of their employers, to act upon it, even to the extent of deserting the party in the uninhabited wilderness. The disadvantages arising from these causes are of course diminished in proportion to the tact and general good management of the person in charge of the party, but at best there is considerable risk. In our case this would have been especially serious, owing to the distance from civilization of the scene of our labours, and the length of time we expected to be at work. With a view of avoiding this risk, it was thought advisable that at least half our *voyageurs* should be white men, and that the Indians should be depended on only for guides. I therefore hired four white men in Ottawa, and set out with these, hoping to have no difficulty in hiring, at Temiscamang, a couple of Indian hunters acquainted with the country, thus making up the number of six which would be required for the season. In addition to this, I proposed to pick up some additional hands before leaving the Ottawa steamers, to be taken as far as Temiscamang, so that our supplies might be got up at a single trip. This would have been a good plan, if white men could have been had who were as good, or nearly as good canoe-men, as most Indians are. Such men, unfortunately, I failed to find, and of the four who were hired, two showed symptoms of serious illness before reaching Temiscamang, and had to be left behind. More unfortunately still, we found the Indians of the Ottawa and Temiscamang exceedingly difficult to deal with. Most of them demanded from two to three dollars a day for their services, and the few who were found willing to go with us on more reasonable terms, would do so only for a short time, leaving us perhaps when it would be still more difficult to supply their places. Similar difficulties attended us during the whole season, seriously interfering with the success of the work. A natural consequence of this state of things was, that our operations were limited to a smaller area than would otherwise have been the case. We had the advantage, however, of being able to do our work somewhat more minutely than we should have done if we had had the means of travelling more rapidly. We were also enabled to make a large collection of specimens of the rocks met with. These specimens are now in the Museum of the Survey, and as there is reason to believe that they represent pretty correctly the crystalline rocks of the whole region, a careful study of the collection will be of the greatest value in preparing for future explorations.

Difficulty in  
dealing with the  
Indians.

Excursions  
from Fort Te-  
miscamang.

Starting from Fort Temiscamang, three different excursions were made.

The first and principal one extended northward to Lake Abbitibe, and included a survey of that lake; the second was up the Blanche to Round Lake; and the third up the Ottawa through Lac des Quinze to Lake Mijicowaja. I shall describe each of these in the order in which they were made.

#### TEMISCAMANG TO ABBITIBBE.

Leaving Fort Temiscamang on the 11th of July, we set out for Lake Abbitibe by the route usually followed by the canoes of the Hudson's Bay Company. From the head of the lake, we ascended the Ottawa to Lac des Quinze, a distance of about fifteen miles, though in a straight line the distance is only eleven. This portion of the Ottawa is locally known as "The Quinze," from the fact that, in ascending it in canoes, about fifteen portages have to be made, though the number varies according to circumstances. Its general upward course is E. by N., or nearly at right angles to the general direction of the valley of Lake Temiscamang, and that of the River Blanche, its extension northward. It is, for the greater part of the distance, a succession of formidable rapids and cascades, the difference in level between the two lakes being probably not less than 250 feet. The rocks are well exposed throughout, especially at the portages. I shall therefore describe the rocks with reference to the various portages. The first of these is about two miles above Lake Temiscamang, and is succeeded by two others in a distance of a little over a mile. The first two are quite short, and overcome two falls from ten to twelve feet high; the third is half a mile long, and the fall is about fifty-six feet. At one point in this latter, there is a descent of about twenty feet in a single fall, which appears to be the highest at any one point on the Quinze. The rock exposed at all these portages appears to be very uniform in character, being a very hard, dark grey silicious mica slate, or schist, usually having a rather imperfect cleavage parallel with indistinct whitish lines and streaks. These lines, though usually obscure, were always detected on close inspection; and as they are remarkably uniform in direction and inclination, and appeared to correspond with occasional slight variations in texture and colour, I think they may be regarded as indicating the bedding of the rock. This supposition is confirmed by the fact that the dip which they give corresponds with that observed farther up at various points where there cannot possibly be any doubt of its character. The dip obtained in this way, on the first three portages, varies in direction from 50° to 80° W. of N., and in amount from 61° to 85°, the prevailing strike and dip being about N. 70° W. < 70°. The direction of the dip appears to become more nearly west, and the inclination less in going up the river.

Lac des Quinze  
or "The  
Quinze."

Rapids and  
Cascades.

Three portages.

Uniform char-  
acter of the  
rocks.

Above the third portage, there is an interval of nearly three miles.

before the fourth is reached. The rocks are the same, as far as they are seen, but there are few exposures. The fourth portage is the first of another group of three, occurring in about the same distance as the first three, and situated on the south side of an island which here divides the river into two channels. It is only a few chains long, and overcomes a beautiful cascade just above where the two channels unite. The whole fall at this portage is about twenty feet. The rock is the same as on the lower portages, except that it is finer and more compact in texture, and less silicious. The dip, observed only at one point, is S. 68° W. < 62°.

Second group  
of three portages.

Fifth portage.

The fifth portage begins about a quarter of a mile above the last, is nearly half a mile long, and the fall in the river is about fifty feet. The rocks are well seen, and consist chiefly of fine-grained, rather soft mica slate, cleaving readily into thin regular sheets. The colour is lighter than on the lower portages, and considerable masses are very soft, and greenish-drab in colour, approaching in character to nacreous slates. In the lower part of the portage, the slates are interstratified with massive-grey quartzites, very slightly micaceous. At the head of the portage, crystalline diorite forms a ridge of about a hundred paces wide, having a direction which accords with the strike of the slate rocks. The dip of the rocks on this portage is well seen, and is pretty uniform throughout, being about S. 34° E. < 76°. Similar soft rocks occur along the river for about three miles farther, for which distance the river runs nearly in their strike, or about N. E. and S. W. The dip, for the greater part of this distance, as on the portage just described, is to the south-eastward, but at so high an angle that a very slight change would give an inclination in the opposite direction, which is the prevailing one throughout the Quinze section. No lower inclination than the above (76°) was observed, and in the upper part of the distance the strata are generally nearly vertical.

Crystalline  
diorite.

Sixth portage.

The sixth portage is about a quarter of a mile above the fifth, and reaches to within a few yards of the head of the island. The fall here is about eight feet. On the upper part of the island there is a conspicuous exposure of a light grey granitic gneiss, consisting of glassy quartz and white feldspar, with a smaller amount of dark brown mica in small scales. The whole mass, as far as observed, is quite uniform in colour and texture, and occasionally there is a decided parallelism in the arrangement of the constituent minerals. The strike and dip of the planes thus indicated, at the only point where they were well observed, is the same as that of the stratified rocks in the vicinity. The whole rock, however, is affected by another remarkably regular set of divisional planes, forming layers from two to five or six feet thick, and of which the underlie is about N. 8° E. < 26°. The mass is lenticular in form, and is about six hundred yards long by one hundred wide, the longer axis being approximately parallel with

Granite.

Divisional  
planes.

the strike of the slate rocks in the vicinity. On the south-west side it presents a nearly vertical escarpment facing to the south, and rising to a height of about a hundred feet above the river. At the base of this cliff, near the head of the portage, there is an exposure of soft, greenish-grey, massive, steatitic rock; and a little farther up, soft chloritic slates are seen in contact with the granitic gneiss, sometimes corrugated and apparently un-conformable with it, but at other points quite conformable. For about two miles above this island, as already mentioned, the soft slates are the pre-dominating rock, and the river runs in their strike; but besides these, diorites and dioritic slates are met with occasionally, and appear to come in from the south-east side. At the end of this distance there is an abrupt turn to the south, going up the river.

Just before reaching the turn, there is a short portage (the seventh from Temiscamang) on the north, or right bank of the river. This leads from the river to a small lake, after following which, for a few chains the canoe route passes into the Ottawa again by the outlet of the lake. Immediately below the portage, a bed of greyish felsitic rock was observed, containing a considerable quantity of iron and copper pyrites disseminated through it. At the outlet of the little lake, mica slate and micaceous quartzite, similar to that on the lower part of the fifth portage, were observed; but after a short distance these give place, on the S. E. side, to diorites and dioritic slates:

The upward direction of the river, for about three miles, is a few degrees E. of S. A portage leads from the river immediately below the turn, on the opposite side from the above small lake, to another small lake situated in a ravine running parallel with the river above the turn, and about half a mile long. This portage is about three hundred paces long; and beyond the lake, another portage of similar length continues in the same direction, to the river at the foot of a lake-like expansion. From this point to the turn, a distance of nearly a mile, the river flows swiftly, with occasional falls, between high rocky banks, and the total fall is a little over forty feet. The canoe-route just described crosses the strata nearly at right angles, and the rocks are well exposed. These are chiefly massive crystalline diorites. At the foot of the lower portage, however, the diorite is not distinctly crystalline, and is occasionally slaty. In some parts it contains much epidote in veins and disseminated grains. Much of this fine-grained diorite seems made up of flattened shuttle-shaped masses from three to twelve inches, or more, in width, and perhaps six or eight times as long. At one point, a width of about twelve feet was made up of regular hexagonal columns, having a diameter of about ten inches, and inclining at an angle of  $57^\circ$ , in a direction S.  $42^\circ$  W. Towards the head of the second portage, the slaty character is in some places pretty highly developed.

Quartzite and  
magnetic iron  
ore.

The stratification of the massive crystalline diorites, which occur largely in this locality, is well shown by the frequent occurrence of quartzite in thin, regular layers, and often interstratified with similar layers of magnetic iron ore. The most conspicuous example of this which was observed is near the head of the lower portage, where a thickness of about thirty feet is made up of such layers. The quartzite is fine and close-grained, sometimes approaching jasper in character, and in layers from the thickness of paper to about an inch. The colours are light and dark grey, and blood-red. Interstratified with these are similar layers of black magnetic iron, forming about a fourth of the whole. These various layers being perfectly regular and even, and the different colours alternating with each other, the rock has a very striking appearance. The dip of these strata is N. 70° W. < 70°.

After passing these two portages, which, with the preceding short one, may be regarded as a third group of three, there is an interval of about a mile to the next. The direction, as already stated, is S. by E., and the strata are crossed obliquely, the dip being still W. by N.

Tenth portage.

From the foot of the next, or tenth portage, the direction is east to the Lac des Quinze. On this portage, which is the longest on the Quinze, its length being a little over half a mile, the rocks are well seen, and are slaty throughout, displaying a fine but distinct lamination, and are chiefly hornblende slate. It is usually greyish-green in colour, but frequently there are streaks and patches tinged with red. There are also in many places numerous obscure lenticular masses of a feldspathic character, lighter in colour than the above, and showing crystals of feldspar, and usually flakes and streaks of dark green hornblende. The latter, as well as the whole mass, which may be from an inch to several feet long, and from a line to several inches in thickness, are parallel with the general bedding of the rock. The dip at the foot of the portage is W. < 62°; about two hundred paces to the eastward, S. 82° W. < 45°; and at the upper end, S. 78° W. < 50°. The fall in the river here, as nearly as I was able to ascertain it, is about twenty feet.

Hornblendic  
slates.

Continuing up the river, the rock is hornblendic slate, differing from the last chiefly in being apparently quite homogeneous in texture, and in its dark greenish-grey colour. The same obscure interlamination of darker and lighter layers was observed, and the rock cleaves with tolerable facility parallel with these. This rock, as well as the last, though usually hornblendic, occasionally contains considerable mica. It occurs for about half a mile across the strike, extending across the next, or eleventh, portage, to about half way between it and the twelfth, which is the last before reaching Lac des Quinze. Here it is succeeded and underlaid by syenitic gneiss. For some distance before it gives place to the latter, it is more coarsely schistose, and the colour is lighter and more

Syenitic gneiss.

nearly grey. There are also lighter and darker bands, and immediately at the base there are occasionally thin reddish layers resembling the underlying rock. At this point the river expands to a width of about a <sup>width of the</sup> quarter of a mile. The dividing line between the rocks just described <sup>river.</sup> and the succeeding gneiss crosses this wide part obliquely, the rocks being exposed on both sides. On the south side the shore is low, and the rock is often concealed; but the two varieties, though not seen immediately in contact, were seen within four or five feet of each other at a point where the rock rises only a few inches above the water. On the north side there is an interval of 200 paces between the last exposure of slate and the first of gneiss. The dip here, as on the portage below, is S.W.  $< 50^\circ$ , while on the south side it is, immediately at the point of contact, S.  $32^\circ$  W.  $< 52^\circ$ . In both cases the dip of the two rocks, where they approach nearest to each other, is the same. The gneiss is made up of reddish feldspar, with a considerable quantity of dark green hornblende, and a smaller amount of glassy quartz; sometimes it contains a little mica. It is moderately large-grained, and breaks up readily under the hammer. The hornblende and mica are so arranged as to give the whole a stratified appearance, which, though usually obscure, is often sufficiently distinct to allow of the dip being ascertained. This rock occurs, with little change, to Lac des Quinze, a distance of about three-fourths of a mile in a direction nearly east. At the head of the uppermost portage, however, a quarter of a mile to the eastward, though made up of the same constituents, it is coarser, and has a porphyritic appearance owing to the occurrence of numerous crystals of reddish orthoclase, many of <sup>Large crystals</sup> them as much as half an inch across. <sup>of orthoclase.</sup> The stratification is very obscure in this locality, but some distance further east it is quite plain and unmistakable. The fall in the river at the last (12th) portage is about ten feet, and at the next one below, eighteen feet.

In regard to the levels given in this Report, it is necessary to state <sup>Levels.</sup> that they are only approximate, being the result of observations with a small aneroid barometer. It is believed, however, that they are on the whole pretty accurate. We had occasion to pass between Lakes Temiscamang and des Quinze four times in the course of the summer; each time barometric observations were taken at both extremities of every <sup>Barometric</sup> portage, and the average of the four results adopted. <sup>observations.</sup> In addition to this, the difference in level was calculated from the mean of a large number of readings taken during steady weather both on Lake Temiscamang and on Lac des Quinze. The two results agree so closely that I can state, with a considerable degree of confidence, that Lac des Quinze is <sup>Height of Lac-</sup> about 260 feet above Lake Temiscamang. <sup>des Quinze.</sup>

Lac des Quinze is an expansion of the Ottawa, and is in most parts about a mile wide. Its direction, going up stream, is south-east for eight



Dimensions  
of Lac des  
Quinze.

miles, then north-east for fifteen miles. At its lower extremity a bay extends northward, with a tolerably uniform width of about a mile, for a distance of eight miles, when it divides into two arms continuing in the same direction for about three miles further. About two miles above the first bay another bay, rather less than half a mile wide, extends in the same direction for three miles; and near the point where the direction of the main body of the lake changes from S.E. to N.E., a third bay extends southward for five miles. These three bays are as nearly as possible parallel, their direction being a few degrees E. of N. and W. of S. This is also the direction of the strike of the rocks on the first two; the third I did not examine. The rock is chiefly grey syenitic gneiss, generally highly quartzose. It is often schistose, and sometimes passes into well-marked hornblende schist, consisting chiefly of glistening black plates of hornblende with some mica. This rock was observed especially along the east side of the lower half of the principal bay, and it seems probable that all these bays lie on the strike of similar schistose bands. On the north side of the lake, between the first and second bays, the rock becomes finer in texture, with a granular appearance, sometimes resembling a sandstone, and frequently contains a considerable amount of epidote. On the lower part of the lake massive crystalline diorite was observed at several points, and evidently belongs to two dykes which cut the above rocks. They appear to have a course about N. by E. and S. by W., and to be from fifty to one hundred feet wide.

Three Bays.

Diorite dykes.

The mean of a number of dips observed at various points along the east side of the first or principal bay, from one to four miles from the foot of it, was W.  $< 29^\circ$ ; that of a similar number taken along both sides of the second bay was N.  $85^\circ$  W.  $< 45^\circ$ .

Boundary between the gneisses of Lac des Quinze and the overlying slaty rock.

On the accompanying map, I have indicated the dividing line between the gneissoid strata of Lac des Quinze, and the overlying series of slaty rocks. Assigning to it a direction a little E. of N. and W. of S., which appears to be that of the general strike of the rocks of both divisions, it would, when continued southward, coincide very nearly with the line traced for six or eight miles by Sir W. E. Logan, as the boundary between the Laurentian and Huronian on Lake Temiscamang, near the mouth of the Montreal River. Continued in the opposite direction, it would run a little to the westward of the first described or most westerly bay of Lac des Quinze, and parallel with it.

Canoe route from Lac des Quinze to Lake Abbittibe.

The distance in a straight line, bearing N.  $6^\circ$  W., from the outlet of Lac des Quinze to the Hudson's Bay Company's post on Lake Abbittibe is about seventy-six miles. The canoe route followed by us passes from the head of the western arm of the first bay of Lac des Quinze up Lonely River, and thence through two long narrow lakes, named respectively Obikoba and Opasatika, which are connected by a small stream. With the exception

of a short portage, at a rapid with a fall of four or five feet on <sup>Rapid on Lonely River.</sup> Lonely River, a little below Lake Obikoba, there is uninterrupted navigation for canoes from the foot of Lac des Quinze to within half a mile of the height of land between the waters of the Ottawa and those flowing to Hudson's Bay, there being scarcely even a perceptible current to overcome all the way.

The distance from the mouth of Lonely River to the height of land is about thirty-one miles. The rocks over the greater part of this distance are of the same gneissoid character as on Lac des Quinze. The regular north and south strike, and westerly dip, were, however, not observed farther than about half way up Lac des Quinze Bay, on the upper part of which very few rocks of any kind were seen. On Lonely River, and on <sup>Lonely River and Lake Obikoba.</sup> the lower part of Lake Obikoba, the stratification was not apparent. The rock is usually granitic, fine-grained in texture, and of very light grey, brown, or reddish colours, often approaching white. Associated with this, there is often another somewhat similar rock, but containing a large amount of black hornblende, giving the whole a dark colour. This appears to cut the former, but the two varieties are often so entangled with each other, that it would be difficult, without examining a large area, to determine which is the intrusive rock. This is characteristic of the whole district, along the line examined, from the head of the Lac des Quinze bay to the foot of Lake Opatatika, a distance in a north and south direction of about fifteen miles. There are also many veins of coarse granite, <sup>Granite veins.</sup> consisting usually of vitreous quartz, red feldspar, and brown or greenish mica. The feldspar is occasionally milk white, giving a white or light grey rock. It is plain, however, that the staple rock of this district is gneiss, which was observed, especially in the northern part of the above mentioned fifteen miles, to pass into a distinctly stratified schistose rock chiefly composed of quartz and mica. The best instance of it occurs on the upper part of Lake Opatatika, just above where, going northward, the <sup>Lake Opatatika.</sup> lake suddenly contracts in width from upwards of half a mile to six or eight chains. Here a well defined micaceous gneiss was observed, very regularly and finely stratified, the dip being  $S. < 77^\circ$ . Wherever the stratification appeared in this locality, the strike usually approached east and west, with a dip to the south, the inclination apparently becoming less going northward.

Continuing northward, the rock on the lower part of Lake Opatatika, where it is well seen, is the same fine-grained granitic gneiss, but it is not so much cut up and disturbed by veins and dykes as the above, and it is generally quite distinctly stratified, the bedding being often shown by the occurrence of lighter and darker bands, owing to the varying amount of dark mica in the rock. The same rock occurs all along the lake for about nine miles, and then gives place to a series of slates and schists similar to

those of the Quinze. It seems to occur here in the form of a low anticlinal, the dip being southerly in the lower portion of these nine miles, and in the opposite direction in the upper portion. Epidote occurs occasionally in this rock, especially in or near small veins, in much the manner as it does in similar rock near the foot of Lac des Quinze.

Towards the north end of Lake Opasatika, as already stated, these gneissoid strata give place to others of an entirely different character. The upper part of the lake is much wider than the lower half, the width being upwards of two miles. From the east side a bold tongue of land nearly a mile wide extends more than half way across, the extremity facing to the west, and divided into two small promontories by a narrow deep bay. Along the edge of the water round the lower promontory there are exposures of a dull grey micaceous schist, much resembling the lowest members of the slaty series of the Quinze, but more micaceous and somewhat more coarsely schistose. This is overlaid by a rather complicated and greatly varying series of strata which the time at my command did not enable me to examine very minutely. First, there is a thickness of twelve or fifteen feet made up almost entirely of foliated brown mica, very much corrugated, and often folding round what appeared to be nodular masses of grey quartzite often nearly a foot in diameter. Succeeding this there are thirty or forty feet of quartzites and hornblendic schists, including layers containing large quantities of magnetic iron, always finely stratified, and having exactly the appearance of having been originally in the condition of fine sand. Along with these there is also a layer eight or ten inches thick made up chiefly of magnetic pyrites. A specimen of this having been submitted to Dr. Harrington was found to contain traces of copper and cobalt. Above these quartzites there is a considerable thickness of massive steatitic rock and steatitic schists, with probably chloritic schist. These steatitic rocks contain numerous minute grains and octahedral crystals of magnetic iron. The dip is to the eastward, at an angle of about  $40^\circ$ , but the rocks are much disturbed. The northern part of the tongue of land above described is made up of massive crystalline diorite, evidently a dyke, running apparently, in a direction a little north of east.

Immediately opposite, on the west side of the lake, similar rocks are seen, but they are still more irregular. Crystalline diorite occurs in the line of the above dyke, and is no doubt a continuation of it. Immediately to the south of the diorite there is a large exposure of massive greenish-grey steatitic rock, while to the north of it mica schist occurs along the shore in such a way as to give the idea that an anticlinal axis occurs beneath the waters of the lake. There are also on the west shore some exposures of a soft greenish talcose slate containing great numbers of cubical crystals of iron pyrites, some of them more than half an inch in diameter. The

Rocks of the upper part of Lake Opasatika.

Magnetic pyrites with copper and cobalt.

Steatitic schists with magnetic iron.

Diorite dyke.

Talcose slate with iron pyrites.

dip of all these rocks is so irregular that it was found impossible to form any correct notion of their general attitude. Similar rocks, however, are well seen a little farther north, towards the height of land, and the strata are more regular, the dip being usually N. by W. Proceeding up the lake, no rock was seen for about two miles, beyond which on both shores there are large exposures of coarse mica schist; but as higher strata are reached, the rock becomes finer grained and more compact, and is associated with close-grained hornblendic slate, precisely similar to that on the Quinze. The dip, as already stated, is northerly, generally somewhat to the west of north. The inclination is at first from  $20^{\circ}$  to  $40^{\circ}$ , but increases on going northward.

At the head of the lake, the rocks last described are succeeded, in ascending order, by conglomerate. The matrix is usually a dull greenish fine-grained sandstone or quartzite, and the imbedded pebbles consist of syenite, greenstone, chert, and white quartz. They appear to be all rounded, and are usually small, but are occasionally nearly a foot in diameter. Sometimes the rock is chiefly made up of these pebbles, but sometimes they are sparsely scattered through the matrix. From this to the Height of Land, the distance is about half a mile, and there a similar rock was observed; but at an intermediate point it is a hard greenish-grey slate, the slaty structure not very well developed, and the rock apparently dioritic. All these rocks appear to dip with tolerable regularity a little W. of N., and the angle of dip at the head of Lake Opatatika is from  $70^{\circ}$  to  $80^{\circ}$ .

Continuing northward, across the last mentioned conglomerate, and over the Height of Land portage, the rock exposed on a small lake beyond the latter is dark greenish diorite, with little or no appearance of stratification. From this lake, which is about a mile long, the head of Lake Matawagogig is reached by a small tortuous stream without any rapids. The distance from the Height of Land portage to Lake Matawagogig is about two miles, and the direction a little west of north. Here the rocks are similar to those between the head of Lake Opatatika and the Height of Land, but the conglomerate, of which, however, not much was seen, is finer, having a very hard, close-grained matrix, and closely resembles the slate conglomerate of Lake Temiscamang. The distance across the measures to this point, from the part of Lake Opatatika where this series of strata with a regular northerly dip was first observed, going northward, is about five miles; while from the point where the micaceous schist first appears, succeeding the gneiss, the distance is about ten miles.

It will be seen by these observations that on Lake Opatatika we crossed the boundary line between the two great classes of rocks described in this report, the gneissoid division being on the south, and the slaty and dioritic division on the north. It seems probable that, from where this line was

crossed near the head of the Quinze, it runs northward for a few miles, and is then thrown to the westward, how far I had not the means of determining. It may curve round uninterruptedly to Lake Opatatika, or it may be intercepted by the gneissoid rocks just described, extending westward to join similar rocks met with later in the season, about twenty-five miles to the west, on the River Blanche. The former supposition seems the more probable, and I have so indicated it, provisionally, on the accompanying map.

About a mile and a half south-westward of the head of Lake Matawagogig, and just on the north side of the Height of Land, two remarkable hills rise to a considerable height above the surrounding country. All the way from the foot of Lac des Quinze, the country is comparatively low, no hills being seen which appeared to rise more than 150 feet above that lake, but these two hills are more than 700 feet above it. The two face each other in a south-west and north-east direction less than half a mile apart; and at a distance of twelve or fifteen miles in a direction W. by S. an exactly similar hill is very conspicuous, and is said by the Indians to be the highest hill in this part of the country. We ascended the higher of the two nearest ones, reaching it from the small lake already mentioned, on the north side of the Height of Land, the direction being about west, and the distance about a mile and a-half. First, we passed over some low hills consisting of dark greenish diorite, similar to that seen on the lake from which we started; then for a short distance over flat ground where no rocks were seen, beyond which, on the slope approaching the high hill, exposures were met with, of a fine hard bluish-grey slate. The summit of the hill itself was found to consist of very hard close-grained grey quartzite. It was observed to contain what seem to be very small pellucid grains of quartz, and occasional small crystals of feldspar, the whole weathering brown. This rock seems to compose the whole summit of the hill, which is about ten chains across. So far as seen, it is perfectly uniform throughout, without the slightest indication of lines of deposition, and on all sides, except the north, forms vertical cliffs, apparently two or three hundred feet high. The height of the summit of the hill above Lake Matawagogig was found to be 690 feet. The other hill, which is not quite so high, is separated from this one by a very deep, narrow ravine. It presents exactly similar appearances, as does also the more distant one already mentioned, so much so that it seems very probable that all are composed of similar rock.

From the summit of the above hill, a good view is obtained of the surrounding country, and it was observed that on the north a series of hills extends east and west for many miles. These hills are not so high as the one from which they were seen, though many of them are probably not less than 300 feet above the general level; and instead of rising, like it, square

Remarkable hills.

Diorite, slate and quartzite.

Fine view of surrounding country.

and precipitous, they are all rudely cone-shaped, and appear to be mostly isolated. They form a conspicuous feature over a large extent of country, and will be again referred to.

From Lac des Quinze to the small lake which occurs at the foot of the Height of Land portage, a distance of about thirty miles, the rise is only about ten feet: thence crossing the portage, three-quarters of a mile in length, there is a rise of about sixty-five feet in the first eight or ten chains and then a gradual descent of forty feet to another small lake, the water of which discharges by the Abbittibe River, the fall in which, to Lake Abbittibe, is about fifty feet; and therefore the latter lake is about fifteen feet lower than Lac des Quinze. As this lake has been estimated to be about 260 feet above Lake Temiscamang, and as the latter is 612 feet above the sea (Geology of Canada, 1863, page 6) the height of Lake Abbittibe above the sea is about 847 feet.

Continuing northward to Lake Abbittibe, we passed through Lakes Matawagogig and Agotawekaim, respectively eight and six miles long. These are connected by a small stream, with four short portages, the distance being about eleven miles. On this part of our course, we passed through the hilly country referred to above. With the exception of an island in the upper part of Lake Matawagogig, composed of reddish granite probably intrusive, the only rock seen all the way is a hard, fine-grained, greenish-grey diorite, in which no appearance of stratification was observed. In most places, the rock is more or less vesicular, the vesicles being usually filled either with calc-spar or white quartz. It also contains, usually, more or less pyrites in disseminated grains.

A few chains below Lake Agotawekami, the outlet of that lake joins the Abbittibe River, flowing from the south-west, and this we followed down to Lake Abbittibe, a distance of about nine miles. The massive diorites were not traced farther than to within a mile or two of the foot of Lake Agotawekami, where they give place to obscurely stratified, dark greenish-grey, dioritic schists. These seemed to have a strike approaching east and west, as did also a somewhat similar rock at a short portage a little over a mile below the lake. At an intermediate point, however, a rock was observed which appears to be an impure limestone. It is very close-grained and homogeneous—slightly saccharoidal—in texture, of a light grey colour, but somewhat harder than ordinary limestone. As the locality was not examined very minutely, the extent of it was not ascertained. About a mile below the portage, a somewhat similar calcareous rock occurs, but differing in being mottled with greenish and pale pink spots. This rock appears to be partly composed of serpentine, and a specimen of it is at present under examination.

A track survey of the route followed by us from the Ottawa to Lake Abbittibe, was made several years ago by Mr. Lindsay Russell, P.L.S.,

Height of Lake  
Abbittibe.

Vesicular diorites.

Dioritic slates.

Limestone.

Survey by Mr.  
Lindsay Russell.

and his plan has been used in constructing a general map of the region to illustrate our observations on the geology. Lake Abbittibe was also sketched by Mr. Russell with a remarkable degree of general accuracy. There is, however, necessarily an absence of details in the conformation assigned by him to the shore lines, which rendered it difficult for me to indicate on his plan the precise position of the rocks observed on the ground. It was therefore considered advisable to make a micrometer survey of this lake, from which, accordingly, it has been laid down on the accompanying map.

Micrometer  
survey of Lake  
Abbittibe.

Lake Abbittibe consists of an upper and a lower lake. The upper lake, the eastern extremity of which we have now reached, lies due east and west. Its length is thirty-three miles, and its width from two to eight, except a little to the eastward of the middle, where a bay extends eight or ten miles to the north, and another bay directly opposite increases the width of the lake two or three miles southward, giving the upper lake a total width here of about seventeen miles. At the north-west corner, it is connected with the lower lake, at its south-east side, by the *Narrows* running in a direction about N. by W. for two miles. The latter is rudely circular in form, with a width varying in different parts from fifteen to twenty miles. The greatest length of the whole, in a direction about W. by N., is about forty-seven miles. The shore line in both lakes is exceedingly irregular, and the number of islands in all parts is very great. The main body of the lower lake is to the north of that of the other, so that an east and west line can be drawn on the north side of the latter, but cutting off the above-mentioned bay, which when continued westward will pass to the south of the lower lake. The principal stream falling into Lake Abbittibe is the Abbittibe River, by which we reached it, but there are several other tributaries nearly as large. The outlet retaining the same name flows from the south-west part of the lower lake, and was surveyed for about seven miles, to the first fall. Its direction for the first two miles is south-west, beyond which it is west to the falls.

The *Narrows*.

Abbittibe  
River.

Rocks of Lake  
Abbittibe.

Serpentine.

The position of the two portions of this lake with reference to each other is closely connected with the geological structure, the longer axis being parallel with the curved line which represents the strike of the rocks. The rocks belong to the same two classes met with farther south. Gneissoid and granitic rocks occur all along the north side of the upper, and on the south-east side of the lower lake, while the other portions of both are occupied by micaceous, hornblendic, and chloritic schists, fine-grained hard quartzites, diorites, and dioritic schists, with serpentines. The dividing line between the two classes of rocks, as shown on the map, coming evidently from the east, passes to the south of the east end of the upper lake; and, turning north for three or four miles, divides longitudinally, the club-shaped peninsula on the west side of which the Hudson's

Bay Co.'s post is situated, and strikes across to the north shore, where it again turns westward. After following the north shore for a few miles, it continues westward through the lake, (having some of the islands on one side, some on the other,) cutting a thin slice from the north side of a mallet-shaped peninsula extending more than half way across from the south side, and situated towards the west end of the lower lake. Still continuing westward, it passes to the south of the Narrows, curves round to the northward in the south-east part of the lower lake, returning on itself in a north-easterly direction, so as to include a space of which the width is twelve or fourteen miles. It would appear, therefore, that this is the western extremity of a band of these rocks coming from the eastward, or probably, considering the prevailing strike of the contiguous stratified rocks, from a direction north of east. I have no means of forming even a conjecture as to how far they may extend in this direction.

The gneissoid rocks on this lake, as far as they were examined, are uniformly massive and coarse-grained in texture, and usually of a light grey or brown colour. They are chiefly composed of vitreous quartz, white or light flesh-red feldspar, and brown, sometimes greenish mica, in large scales and flakes, the latter being in most cases parallel with each other. Sometimes the mica is partially or wholly replaced by hornblende. At the western extremity of the area occupied by these rocks, in the vicinity of the *Narrows*, the gneissoid structure is generally obscure, and sometimes could not be seen at all. Near the lower end of the *Narrows* on the east side, a coarse grained syenitic rock was observed, which contained a considerable amount of magnetite.

The schistose, or slaty rocks, which, as already stated, occur over the greater portion of the lake, have a strike for the most part parallel with the line indicated as the boundary of the gneiss. It cannot be said, however, that they were actually seen to curve round the western extremity of the band of gneiss included within this line, as no exposures of rocks showing stratification were observed in this locality; but in the case of the subordinate curve indicated on the map as occurring near the east end of the upper lake, they were plainly seen to conform with the outline of the gneiss. The general strike on the south side of the gneissoid area, as seen along the south side of the upper lake, varies but little from east and west; and usually where they were seen within a mile or so of the gneiss the strata are either nearly vertical, or they dip away from the gneiss, the angle of inclination being sometimes as low as 45°. About the middle of the upper lake, however, the strata, in many places, dip towards the gneiss, at angles varying from 45° to 70° or 80°: but this is usually at a considerable distance from the latter, and the locality shows indications of disturbance. The strike of the similar rocks occurring on the north half of the lower lake, where it is generally well seen, is about E. by N., a



direction which would carry them along the north side of the gneissoid area. The dip is seldom less than  $80^{\circ}$ , and it seems to be about as often southward as northward.

Off a prominent point, about the middle of the west side of the lower lake, there is a small island, not more than six or eight chains long, which is composed of a dark green, rather soft rock, with splintery fracture and resinous lustre, and weathering a dull white. It is so strongly magnetic that our compasses were found to be quite useless on this island. This rock proves to be serpentine, and specimens of it being, at your suggestion, handed to Dr. Harrington for examination, it was found to contain grains of chromic iron.

Serpentine with chromic iron.

At several points along the south side of the upper lake there are exposures of a rock somewhat similar to that described on page 125, as having been observed on the Abbittibe River about a mile below the portage, and which is supposed to be partly composed of serpentine. This was observed chiefly towards the east end of the upper lake, but it was also noticed on the south-east part of the lower lake. It was not here seen *in situ*, but large angular masses of it were seen on the shore of the lake, in a locality where no other rocks were met with, their appearance being such that there can be little doubt they were not far removed from the parent bed. All the localities where this rock was observed are on a line which is approximately parallel with the general strike of the rocks.

Resemblance to the rocks of the "Quinze."

At many points, especially along the south side of the lake, there are large exposures of dark green crystalline diorites, passing into dioritic schists and having a close resemblance to those of the Quinze. These usually appear to be destitute of any appearance of stratification, but as in the case of the Quinze diorites, the bedding is occasionally shown by the occurrence of thin, angular layers of quartzite, here approaching the character of chert, with thin layers of magnetic oxyd of iron, the quantity of the latter seen, however, being insignificant. Much of the diorite also contains epidote, which is another point of resemblance to the diorites seen on the Quinze.

Diorite hills.

Besides these crystalline diorites, there are hills along the south side of the lake, which, as far as examined, are composed of the same light greenish-grey compact diorites already noticed in speaking of the hills observed along Lakes Matawagogig and Agatawekami, and the connecting stream. They are precisely similar in appearance, and from one of them which was ascended, and which rises to a height of about 400 feet above the lake, the country was seen to be studded with them as far as the eye can reach, looking southward as well as east and west. Diorite similar to that which composes these hills, was also seen at the falls on the Abbittibe River, about seven miles below the lake.

In regard to the stratigraphical relation of the two classes of rocks on

this lake, the only fact which I have to offer is, that at the only two localities where they were observed to approach within about a quarter of a mile of each other, and where both showed stratification, both have the same dip. One of the localities is on the point on which the Hudson's Bay Company's post is situated, where quartzites and slates are exposed on the west, and gneiss on the east side, both dipping to the westward at an angle of about 50°. The other locality is twenty miles further west, where, at the "mallet-shaped peninsula" already noticed, both were seen, within a very short distance of each other, with an east and west strike, and nearly vertical attitude. In both these cases, the only indication of stratification in the gneiss is the parallelism in the arrangement of the different minerals composing it; but this is quite distinct and regular.

Quartzite, slate  
and gneiss.

#### SURVEY OF THE RIVER BLANCHE.

Having returned to Temiscamang on the 27th of August, we started on the 4th of September to commence the survey of the River Blanche. This survey was carried from the mouth of the river, at the northern extremity of Lake Temiscamang, to a small lake about three miles in diameter, known by the Indians as Round Lake.

Round Lake.

The upward direction to the north-west side of Round Lake is N. 36° W., and the distance, in a straight line, about forty-four miles. Following the stream the distance is nearly sixty miles.

Ascending the river, no rock exposures occur for about twenty-five miles, the stream flowing for that distance, with a rather strong current, but no rapids, between banks of clay and sand. Above this there are occasionally exposures of crystalline diorite for several miles, succeeded, a little further up, by chloritic and dioritic slates. Of the former there was very little seen, and the slates were observed only along the edge of the water, at the foot of high cliffs of clay and sand.

Diorite and  
chloritic and  
dioritic slates.

For a distance of ten miles in a straight line, above the chloritic slates, the only rock met with is granitoid gneiss, very similar to that of Lake Abbitippe. Like the latter, it is uniformly coarse-grained and light grey or brown, occasionally red, in colour. On the south-east side the stratification of this rock is well shown, both by the usual parallel arrangement of the constituent minerals, which is here very distinct, and by the occasional alternation of coarser and finer layers. The dip and strike, the latter about N. by E. and S. by W., are exactly the same as those of the slates to the south-east, which, though not seen in contact with the gneiss, were observed at a distance from it not exceeding eight or ten chains. The dip being always nearly vertical, it was found impossible to determine which are the uppermost beds.

Granitoid  
gneiss.

On the north-west side of the gneissoid area, which extends to Round Lake, slates are again met with. The principal exposures examined are

Micaceous and  
hornblendic  
schists.

Dykes.

Intrusive rock.

almost immediately in contact with the gneiss, and are chiefly hard grey micaceous and hornblendic schists; but a little more distant from the gneiss it has a greater resemblance to the slates described above. The strike being E. by N. makes an angle of about  $45^\circ$  with that of the latter. The dip, though sometimes to the northward, appears to be usually to the south, and at a very high angle. In one place the dip is S. E.  $< 55^\circ$ , but the rocks in this locality are much disturbed, and are cut up by numerous dykes of diorite and porphyry, from six inches to as many feet wide. The slates are exposed on this lake for about a mile across the strike, when they are cut off by a rock which appears to be intrusive. It much resembles ordinary redsyenite, but was not observed to contain quartz, being made up of large grains of a rather dark red feldspar with a smaller amount of greenish hornblende, and sometimes a little epidote. This occurs all along the north side of the lake, but I have no means of knowing how far it extends beyond the lake.

#### LAC DES QUINZE AND LAKE MIJICOWAJA.

Departure of  
Indians.

Having again returned to Temiscamang, on the 17th of September, from the survey of the Blanche, I paid off the two Indians who had been engaged for the short term of about two weeks which it was expected would be required for this trip; and notwithstanding that they expressed themselves well pleased with the treatment they had received, as well as with their pay, it was found impossible either to induce them to re-engage or to procure others to take their places; the chief reason being, no doubt, that the hunting season had commenced, and all the Indians were eager to get away to their hunting grounds. We were therefore unable to make further surveys with the micrometer telescope, as to do so we should have required two canoes, and as we had now only the two white men who had been with us the whole season, we could man only one. Under these circumstances it was thought advisable to devote the remainder of the time still available for our work, to making a further examination of the rocks on the Quinze, and exploring the upper portion of Lac des Quinze and Lake Mijicowaja, (another lake-like expansion of the Ottawa, and occurring immediately above Lac des Quinze,) which lakes extend for about thirty miles to the eastward from the point where, at the foot of the first named, we turned northward going to Abbitippe. These lakes, as well as the Ottawa River both above and below them, having been already surveyed and mapped, and no further measurements being necessary in order to fix the positions of the rocks observed, a single canoe was sufficient for this trip. We accordingly set out once more from Temiscamang on the 25th of September.

Second start  
from Temisca-  
mang.

The facts obtained during this excursion in regard to the rocks of the Quinze and of the western portion of Lac des Quinze have been embodied

in the account already given of them. The only rock met with farther east is gneiss, occasionally passing into hornblendic and micaceous schist of a coarse texture. The latter is seen occasionally along the shores of the upper part of Lac des Quinze, where, as already stated, the direction of that lake is north-east for fifteen miles, apparently conforming with the strike of the strata, which dip north-westerly at a high angle. The gneiss is generally reddish and rather coarse-grained, with obscure bedding; but it is often grey in colour, and is also occasionally, regularly and distinctly stratified. Along the upper part of Lac des Quinze the gneiss forms hills which rise sometimes from 200 to nearly 300 feet above the level of the lake, being the highest hills seen between Lake Temiscamang and the Height of Land on the route to Abbitibbe.

Gneiss passing into hornblendic and micaceous schists.

Hills along Lac des Quinze.

Having ascended the Ottawa for several miles above where it falls into lake Mijicowaja, and the season being now too far advanced to allow the ascent of this river to be continued sufficiently far to make it probable that any important results would be attained, we returned to Temiscamang reaching the fort on the 12th of October. After a delay of a couple of days, owing to a severe storm of wind and rain, we set out for home, reaching Ottawa on the 24th of October.

Return to Temiscamang.

#### ECONOMIC MINERALS.

*Copper.*—In several localities copper pyrites in small disseminated grains, and small quantities of the green carbonate of copper, were observed. The latter was noticed particularly in small veins in the diorites and dioritic schists below the eighth portage on the Quinze. At the foot of the seventh portage, which leads from the Ottawa to a small lake on the north side, copper pyrites associated with iron pyrites was observed disseminated throughout a bed, about three feet thick, of a greyish feldspathic rock. The quantity, however, both here and at the other localities where copper ore was seen, is not sufficient to render it of economic importance.

Copper ores.

*Iron.*—Magnetic iron was met with in several localities. The most important of these is that already mentioned, on the eighth portage of the Quinze, which leads from the Ottawa River, immediately below the point where, after flowing northward for three or four miles, it turns abruptly round to the south-west. The portage is on the south, or left hand side of the river, running in a direction about south-east to a small lake in a narrow ravine, and is not more than a quarter of a mile long. The iron ore crosses the portage near the upper or south end. It occurs in the form of layers from the thickness of paper to about an inch, and is interlaminated with similar layers of whitish, grey and dull red, fine-grained quartzite. The iron ore constitutes probably from a fourth to a third of the whole, and as the thickness of the whole band is about thirty feet, the total

Iron ore.

thickness of the layers of iron ore would probably not be less than eight feet. The band was traced along the strike for about a hundred yards. Magnetic oxyd of iron was observed under similar conditions at several points on this portage, and on the next above, but in much smaller quantity. This ore occurs also on lake Opatatika, about six miles south of the Height of Land. On lake Abbittibe, it was observed on the south side of the upper lake, and also on the west side of the lower lake. At none of these localities, however, was it found in important quantities.

Magnetic pyrites.

*Magnetic Iron Pyrites.*—A bed, eight or ten inches thick, composed chiefly of magnetic pyrites, was observed on the west side of lake Opatatika, at the locality already described as the first where, in going north, the gneissoid and granitic rocks of the southern part of that lake are found to have given place to the crystalline schists and conglomerates of the northern part. It is associated with siliceous layers containing a large proportion of magnetite.

Steatite.

*Steatite.*—This rock occurs largely in the same locality as the last; considerable exposures, as has been stated (page 122), occurring on the west side of lake Opatatika. Steatite was also observed on the Quinze, near the upper end of the island, on the south side of which are situated the fourth, fifth and sixth portages.

Roofing slates.

*Roofing Slates.*—On the fifth portage of the Quinze, some of the dark-grey, and light greenish-grey argillaceous slates which are there exposed, have a very perfect cleavage, and would probably be well adapted for roofing purposes.

#### TIMBER.

White and red pine.

White and red pine are found over the whole region examined, and are by no means rare even as far north as Lake Abbittibe; but on this Lake, with the exception of a few healthy-looking individuals, about six feet in circumference, observed near the outlet, they are all very small and scraggy, and are confined to the numerous islands and points. They are quite abundant and of excellent quality on the slopes of the hills along both sides of the Height of Land. When ascending the hill described as rising to a height of 700 feet above lake Matawagogig, on the north side of the Height of Land, several fine trees were measured and found to be from eight to nine feet in circumference, at a height of four or five feet from the ground; and from the summit of the hill, groves of white pine were observed in all directions. White spruce, yellow birch and cedar, are also tolerably abundant, and of good size. Fine specimens of the latter tree—tall and straight—were observed, chiefly in hollows among the hills, on the south side of lake Abbittibe.

Spruce, birch and cedar.

Pine on Lakes Opatatika and Obikoba.

Groves of white pine are conspicuous along the shores of Lakes Opatatika and Obikoba, generally a little distance from the water. Both red

and white pine are met with, but not abundantly, on the lower portion of Lac des Quinze; but with one exception, probably the best timber seen by us during the summer is that which grows on the hills on both sides of the upper part of Lac des Quinzes and the lower part of Lake Mijicowaja. The exception mentioned is on the Quinze, in the vicinity of the fourth and fifth portages, where there is a great quantity of very fine pine, both red and white. There is very little pine on the Blanche, the only specimens observed being a few very small ones near Round Lake.

Sugar maple is tolerably plentiful round the head of Lake Temiscamang, but was not seen further north. The same remark applies to swamp maple and white oak. Large numbers of these grow on low level land near the mouth of the Blanche, and also, in smaller quantities at the mouths of other rivers falling into the same lake. Hemlock is abundant on the lower half of Lake Temiscamang, but no specimens were observed as far north as the Hudson's Bay Company's post.

The most abundant tree in this region, north of the limit of sugar maple, is aspen, after which come canoe-birch, spruce, Banksian pine, and Canada balsam. Elm and ash occur occasionally on low flats as far north as Lake Abbittibe.

#### SOIL AND CLIMATE.

The whole region examined, extending northward from the mouth of the Montreal River, which is about thirty miles south of the head of Lake Temiscamang, may be pretty correctly described as a level clay plain, with a great number of rocky hills and ridges protruding through it. There is a marked distinction between this region and the country to the south. The unyielding Laurentian rocks of the latter maintain a uniformly high surface, considerably higher than the level at which the clay is found; while the softer slates and schists which occupy so large a portion of the country further north have been largely removed by denudation, leaving only the harder rocks—diorites, quartzites, and conglomerates,—to form more or less isolated hills, surrounded by arable clay land.

The height of the clay appears to be pretty uniform throughout the whole region. Around Lake Abbittibe it is about thirty feet above the level of the lake, which was estimated to be 245 feet higher than Lake Temiscamang, giving 275 feet as the height of the clay at Abbittibe above Lake Temiscamang. On the upper part of Lac des Quinze it is occasionally seen along the edge of the lake, and rising about twenty feet above it; and therefore as the latter lake is supposed to be about 260 feet above Lake Temiscamang, its height above that lake would be about 280 feet. On the Blanche, the highest clay plains, about thirty-five miles up the river, are nearly on the same level with Round Lake, which was esti-

mated to be 275 feet above Lake Temiscamang. Clay is seen, I believe on all the portages between Lac des Quinze and Lake Abbitibbe. This would give a greater height than the foregoing, since on the highest of them—the Height of Land portage—it is about sixty feet above Lake Abbitibbe or 305 feet above Temiscamang. Taking the mean of all these heights and adding it to 612 feet, the height of Lake Temiscamang above the sea, we find that the height of the clay plain above the sea level is about 900 feet.

Areas of arable land.

The largest areas of arable land are on the Blanche, and around Lake Abbitibbe. On the Blanche, the banks are at first only eight or ten feet above the ordinary summer level of the river, but ascending the stream they gain in height, step by step, until thirty miles up they rise to a height of from 100 to 150 feet above the water. Until within a few miles of Round Lake, no rocks are seen, except in the channel of the stream or in the face of the cliffs. Towards Round Lake the gneiss only occasionally appears above the level surface. Bluish clay was exposed in the bed of the river all the way to Round Lake, but about half way up is overlaid by a rather coarse brown sand, which in its turn, farther up, is again overlaid by clay. Six or eight miles below Round Lake, where the cliffs are upwards of a hundred feet high, the middle portion consists of sand, while at the base and summit nothing is seen but clay. The level land in the valley of this river will therefore be partly clay and partly sand, perhaps in nearly equal proportions. The width of arable land is probably, on an average, not less than six miles, and may be much more. On the lower levels, a good deal of the surface is probably swampy. The higher levels have been almost entirely denuded of vegetation by repeated fires.

Clay around Lake Abbitibbe.

Lake Abbitibbe is surrounded on all sides by level clay land. At a good many points, however, the rock rises above the level of the clay. This is especially the case along the south side of the upper lake, where the dioritic hills, already described, approach the lake; but even here there is generally a strip of clay land along the shore. To the north, and especially the north-westward, the clay level seems almost unbroken, and it is well known that it extends in this direction to the shores of Hudson's Bay.

Crops.

Several acres of this clay soil are cultivated at the Hudson's Bay Company's post at Abbitibbe, and with satisfactory results. The only crop grown at present is potatoes; but I was informed by the man who has charge of the farming operations, (a French Canadian, who has been more than thirty years at Abbitibbe, but was brought up as a farmer near Sorel, in the Province of Quebec,) that several other crops, including wheat, had been tried in former years, and with such results that he is inclined to insist that all the ordinary cereals can be cultivated as success-

fully at Abbittibe as on the St. Lawrence. Such an opinion from a man who has been for so many years practically engaged in the cultivation of the soil, is worth recording, and ought to be reliable.

Indian corn is grown at more than one locality near the head of Lake Temiscamang, and is said to ripen well. I am able, personally, to testify to this, as I was shown some good ripe ears, which had been grown during the summer of 1872, on the farm of Mr. Angus McBride, at the head of the lake. It should be said, however, that the locality is perhaps unusually advantageous, as, besides being close to the lake, it is particularly well sheltered on all sides, except the south.

I have the honour to be,

Sir,

Your most obedient servant,

WALTER McOUAT.