FIRST REPORT
ON THE
GEOLOGICAL SURVEY
OF THE PROVINCE OF NEW BRUNSWICK.

By Abraham Gesner, Provincial Geologist, &c.

[Continued.]

The object of this report would not be promoted by taking a wider range in this part of the subject, nor is it necessary, if the inhabitants will take the pains to apply to their lands those stores of manure which have hitherto been passed by unheeded. In Great Britain, France, and Germany, marl is considered of vast importance, and its lasting and beneficial effects upon agriculture have been fairly tested. In the United States, land which formerly sold for two dollars and a half per acre, has increased in value to thirty seven dollars per acre, from the discovery and application of marl. In the County of Charlotte, its discovery must be hailed with satisfaction, and time alone can shew the greatness of the prize obtained. It cannot fail to be an object of much importance to this part of the Province, for it will supply the place of lime, which has not been found nearer than L'Etang.

I proceeded along the east side of Oak Bay, occasionally making an excursion into the interior a short distance. Granite, syenite, and trap, are the prevailing rocks. These often pass imperceptibly into each other, and have their component parts so mixed, that it is fre quently impossible to draw a line of distinction between them. Near the mouth of the Warwig, and belonging to the mountainous chain already noticed, the granite appears; and although in general most of its varieties are too coarse to be used in architecture, on the property of JOHN WILSON, Esquire, I discovered a beautiful kind, and if the quantity should be found sufficient, an excellent quarry might be opened, which, from its proximity to the sea and river, would afford every facility required for the ready transportation of its contents. This rock, instead of mica, contains hornblende, united with fieldspar, and quartz, which are very pure, and white, and equally disseminated in small crystals. The quarry will be opened next spring, and considerable advantage may be expected to arise from its discovery, as heretofore the granite used at Saint Andrews, has been imported from the United States, at a great expense; while it is now known that a more beautiful variety of that rock is placed but a short distance from the town.

At Connick's mills, three miles up the Warwig, greywacke and greywacke slate were found, meeting the granite. The schistose rocks contain much sulphuret of iron, which, by being exposed to the atmosphere, decomposes, and covers them with the brown oxide. Near the mill, there is a considerable vein of iron pyrites; this, from its peculiar metallic lustre, had been mistaken for gold. It is scarcely necessary to add, that it contains none of that valuable metal, and is of no practical importance. A large granitic slab, placed at the door of Mr. Connick, contains large crystals of feldspar, schorl, and garnet. The same minerals were seen in a large boulder, by the side of the turnpike. At Bartlett's Pond, there is a considerable formation of reddish silicious rock, containing a transparent crystals of quartz. A chain of small lakes holds a communication between this place and Chamcook, a spot remarkable for its romantic scenery and volcanic character.

More certain proofs cannot be required of a mighty rush of waters having passed over the country from north to south, than is afforded by the *talus* on the southern side of almost every eminence in this part of the Province. This fact is admirably displayed at Sand Point, and a small Island at the head of Oak Bay, where the diluvial *debris* is collected on the side of a mass of rock, upwards of sixty feet high. Circumstances of this kind, I do not recollect to have seen noticed by others, and they will therefore be referred to hereafter. At the extremity of this Bay, and five miles from its mouth, the shore slopes gradually down to the beach. Bricks are here made,—but from the clay being connected with the marl stratum, containing lime, they often crumble down, when exposed to the air and water. Before the clay is used for this purpose, it should be carefully examined, and that kind should be avoided which contain shells, for these, by being burnt, are converted into quicklime—will slake, and destroy the bricks.

On the south side of the Bay, several dikes of hornblende rock were observed, penetrating distorted strata of the greywacke and greywacke slate. These rocks have suffered remarkable changes by the heat applied from beneath during the filling of the dikes, and the sulphur, being sublimed, has united with the iron, and formed the sulphuret of that metal, or iron pyrites. At one place, the greywacke contains a large portion of the decomposable variety of that mineral. This is the hepatic pyrites of Phillips—*(Fer sulfure epigene.)* The oxygen of the atmosphere unites with the sulphur, and forms sulphuric acid. This combines with the iron, and produces the sulphate of iron, (copperas,) which might be manufactured on the spot, without much expense. At Oak Point, the granite rises to considerable height, and quarries might be opened within a hundred yards of the shore. The rock will supply pieces of large dimensions, but its crystals are too large in general to admit of ornamental work.

SAINT STEPHENS.—At Saint Stephens, on the British side, and at Calais, on the American side of the river, there is a variety of syenite, which at several places was seen alternating with the greywacke, and forming the narrow gorge where the river passes. At Mill Town, there is a considerable vein of the pyrites. It was covered by the freshet at the time of my visit, but a specimen from the vein was examined, and its characters fully recognized. Both of the above rocks contain large quantities of this mineral, which, by the action of the air, is converted into the oxides of iron. At several places, and especially on the farm of Mr. MARKS, the syenite decomposes rapidly, and a great quantity of these oxides are mixed in the soil. Large spongy pieces are seen upon the surface, having received their porous structure from the decomposition of the crystals of hornblende and feldspar. The soil is rendered almost barren, and vegetation is destroyed by the water raising from these natural laboratories. The oxides are carried by the rains upon the lower grounds, and bog iron ore is constantly accumulating. This ore might be collected and worked, if the quantity be sufficient, a fact I had not the means to ascertain.

Upon the farm of Mr. WILLIAM PORTER, four and a half miles northward of Saint Stephens, there is a stratum of graphite, (plumbago,) or black lead, situated between perpendicular strata of the schistose rock. This stratum had been opened, and was supposed to be coal. I was unable to examine its thickness, as the excavation was filled with water. The demand for this mineral is not adequate to its supplies. Besides being employed in the manufacture of crayons and lead pencils, it is very useful in diminishing the friction of wooden machinery, and its power prevents iron from rust. Not far from the above farm, limestone was supposed to exist; the rock was, however, found to be greywacke, which occasionally contains beautiful crystals of limpid quartz. The sulphuret of molybdena, a rare mineral, was found here, embraced by a mass gneiss.

Although the tertiary deposits in the neighbourhood of Saint Stephens are much like those before mentioned, the marly strata were not found, notwithstanding they may be discovered by the examinations of the inhabitants. Instead of the argillaceous marl beds of blue clay, containing the remains of the mya, mytilus, and pecten, are spread over considerable tracts, and are frequently covered with thin beds of alluvial sand. The clay exhales the odour of marshes, newly formed by the sea. The soil is of two kinds—the sandy, and the stiff clay: both would be improved by using lime, or marl, for manure.

Saint Stephens possesses a mineral spring of no ordinary medical powers. Near the church, and on the property of Mr. PORTER, a small stream issues from the earth, and contributes to the supply of a brook, crossing the street. The water is very clear—has a weak fetid smell, and unpleasant taste, when first taken into the mouth. I could not have an opportunity to examine this water, until several weeks after it had been taken from the spring, and therefore the following analysis may not be correct, as new combinations may have taken place during that time. The analysis was repeated three times with nearly the same results.

In each wine pint—

Sulphuretted hydrogen	4.	5 cub. in
Sulphate of Soda	5.	4 grains
Lime	2.	5 —
Muriate of Soda	6.	.. —
Oxides of Iron	..	4 —

The sulphuretted hydrogen reddens the infusion of litmus, and precipitates the nitrate of silver black. The sulphate of lime was detected by evaporating a pint of the water down to four ounces, a precipate of the sulphate of lime formed, which was soluble in four hun dred parts of water; and the solution afforded a precipitate with oxalic acid, carbonate magnesia and alcohol.

The aperient effects of this spring are very manifest, and they evidently arise from the sulphate and muriate of soda contained in the water. From the above, it will therefore appear that it is not inferior in its medicinal powers to many of those in England and France. Admitting that the good effects of watering places are in part produced by a change of air, amusement, and scenery, Saint Stephens is pleasently situated, with a fine surrounding country, and will evidently hereafter become a place of considerable notoriety.

There is also another mineral spring at Oak Bay. Its properties appear to be similar to that first noticed, but in consequence of my engagements at the time when the water from it was received, I am unable to give its analysis in the present report.

THE ISLANDS IN PASSAMAQUODDY BAY.

Having procured a boat and good pilots, I proceeded to make an examination of the numerous islands in the Passamaquoddy Bay. It will be seen by reference to a map of the Province, that Deer Island is stretched across the Bay of Saint Andrews in a north east and south west direction. The Scoodiac empties between the south west part of the island and the American Shore, while the waters of the Digdeguash and Magaguadavic are discharged into the sea through two openings between its north east point and the main land of New Brunswick. The largest of these passages is called "Big la Tete," and the lesser "Little la Tete." The island obstructs the ready exit of the waters from the rivers, and the tide rushes through these passages with great rapidity, occasioning eddies which frequently perplex the best pilots.

On each side of "Little la Tete," a coarse red syenitic trap, occasionally covered with detached portions of conglomerate and sandstone were observed. The small islands and rocks situated in and near these passages are composed of the same rocks, into which numerous dikes of the trap have been introduced. L'Etang, or Frye's Island, is valuable on account of being placed within the range of the limestone formation that extends in a north east direction from the County of Charlotte to St. John. The limestone is continuous from one of its sides to the other, and is advantageously situated for being calcined and exported. A quarry has been opened, and a kiln erected by Dr. FRYE, of St. Andrews.—Fuel is abundant, and excellent lime might be supplied, and readily shipped upon a large scale. The same remark will apply to the quarries on the west side of L'Etang harbour, owned by Mr. CALIFF, who is employed in the business, and supplies the settlements along the coast. An excellent quality of marble was seen on the western part of the island, but the rock appears to have been too much fractured to supply large slabs. It is highly crystalline, and will bear a fine polish.

The limestone has been deposited between strata of greywacke, and greywacke slate, but the introductioa of trappean matter from beneath has effected great changes in the composition and position of each formation, and so altered the situation of the strata that it is impossible to ascertain their true inclination. A few small veins of surpentine were observed, and there are numerous veins of quartz intermixed with nodular masses of dark green chlorite, extending through the rocks in all directions. The limestone contains a vein of milky quartz two feet thick; the sulphuret of iron is common, and appears under cirumstances like those already mentioned.

In order to avoid uninteresting details respecting the geographical situation of, and the peculiar circumstances connected with dikes and ridges of trap rock, a particular notice of them is deferred until they can be embraced in one general view, for they are too numerous to receive particular description, unless they should appear to be connected with facts of some practical importance.

A number of small islands at the entrance of L'Etang Harbour were next examined. Many of them still remain without being distinguished by names. They offer but little variety in their structure, having been fixed in their present situations and composed of the same materials as other high lands to which I shall often have occasion to refer. Conglomerate and detached pieces of new red sandstone, interlaced with dikes, is the prevailing character of those isolated rocks, which were not found to possess any minerals of importance.

The White Horse is a rude mass of trap, situated about four miles from L'Etang Harbour; it rises abruptly from the sea to the height of one hundred and fifty feet, and is so perpendicular that the largest ships in calm weather might lie at its sides as at a wharf. This rock has been rent asunder by some sudden force. A deep chasm, called "Styx," and the depressions on the surface, where caves have fallen in, point out how much it has suffered by powerful causes. Not a tree has ever taken root here, notwithstanding the Island is covered with peat, and other decayed vegetable matter, to the depth of four feet. The table land on its summit contains about four acres. This is yearly covered with a fine growth of wild grass, which is mowed and carried away by the people of the inhabited islands. The sea-pigeon and other wild ducks breed here, but their eggs are procured with difficulty and danger, as they always seek seclusion in the sides of the steepest cliffs. During a gale, the little island presents a sublime spectacle. The sea, instead of breaking upon the ordinary inclined plane of the shore, is thrown headlong against the vertical rock, and trembling under the furious lash, the island is almost buried beneath the spray.

The Wolves, six islands of inconsiderable magnitude, are situated at a distance of about ten miles from the coast. These are well known to the mariner, for having been the scene of many shipwrecks. They are composed of trap and conglomerate—situated very unfavorably for the navigation of the coast, and are under the dominion of a poor but hospitable fisherman and his familp.

White, Spruce, Green, Cherry, and Casco Bay Islands, and Pope's Folly, are formed of coarse conglomerate. Sandy Island has a beautiful beach of fine sand, whence its name. Indian Island is a beautiful spot, and consists principally of altered slate. Jouett's Island contains about four acres of soil, resting on conglomerate. Its comfortable mansion is the residence of Captain MOSES, now an officer of Her Majesty's Customs. I have been thus brief in the description of these places, as they were not found to possess any minerals, or quarries of any practical value.

DEER ISLAND.—Deer Island is not less than twelve miles long, and will average about three in breadth. Its south side presents a chain of low hills, composed of trap rock and broken slate. These hills are scattered over an inclined plane, extending to the shore, which is singularly indented, and occasionally occupied by beds of sands and gravel. Sometimes projecting masses of rock extend into the sea, affording fine harbours for boats and other small craft. This side of the island is also sheltered by a great number of smaller islands, scattered along the shore. Many of the hills are naked; others, and the valleys, are covered with a light growth of birch and spruce. Not a few inducements are offered for the inhabitants to cultivate the soil, and a number of fine farms have been cleared; but as fishing is supposed to be the most profitable employment, they have been much neglected. I had hoped to meet the limestone formation somewhere along the shore, but was unsuccessful. The distance to L'Etang, however, is not great, and lime may be readily procured to fertilize the soil, now requiring its application. At a number of places, deep groves appear to have been cut through the rocks, and extend from one side of the island to the other. As these places are worn down smooth, and marked with diluvial scratches, there can be but little doubt that those grooves were produced by a current of water, that has rushed over the surface. Near the "Little La Tete," there are two remarkable eminences, which add much to the natural beauty of the surrounding landscape. The north west side of the island is abrupt. The rocks at several places contain narrow veins of magnetic iron ore, but none of sufficient thickness to afford a profitable supply of that mineral. The precipitous character of its northern side, had arisen from the greater elevation always attained by the "instructive rocks" than those which owe their existence to more tranquil causes; and although the slate, conglomerate, and sandstone cover the tops of the highest hills in some instances, their altitude can always be accounted for by the fact, that they have been uplifted by forces applied from beneath. Vast masses of greenstone may be seen supporting the strata asunder and sloping down their sides. At a few places, toadstone and amygdaloid were noticed, occupying lower situations. The latter often contains in its vesicles calcareous spar, and more seldom zeolite. These are thinly covered with light green chlorite; veins of white quartz, and a kind of hornstone or chert appear very frequently.

CAMPO BELLO.—Campo Bello is upwards of eight miles long, and will average two miles in breadth. Its longest diameter is from north to south, and whether considered on account of its fine harbours, fisheries, or timber, is extremely valuable. The rocks, from Harbour De Lute to Old Friar's Head, are slates, through which large masses of trap are protruded, and elevated to form a number of conical hills or angular prominences, seen scattered over the surface. The changes effected in the slate, where the trap has been forced through, are very remarkable, and the rocks are so much fractured and thrown out of place, that no satisfactory account could be taken of their dip. At those places where the trap and slate are in immediate contact, the changes produced by heat on the latter, are singular and interesting, and sufficient opportunities are afforded to observe those changes from the highest to the lowest of their several degrees. Wherever they are found in juxta-position, and the trap has any considerable dimensions, the slate is converted into novaculite, whetslate, or Turkey stone. Just as a departure is made from a dike, so the effects of the heat which attended its eruption are seen to decrease, until the slate assumes its true argillaceous character. When the dike is narrow, or such as might be called a mere vein, these effects are scarcely discernable, as the accompanying heat of only a small portion of the once melted matter, was insufficient to produce the changes effected by greater eruptions.

The novaculite readily breaks into small rhomboidal fragments: larger pieces can, however, be procured by removing the exposed part of the rocks, and will be found equal in quality to any of the imported oilstones. At Friar's Bay, and in the bank immediately below the village of Welchpool, there are several narrow veins of lead ore. This ore, which is called galena, or the sulphuret of lead, is contained and mixed in veins of quartz and calcareous spar. The largest vein, forming the matrix of the ore, is twenty inches wide, and has two veins of smaller dimensions. By ascending the bank, which is about twenty five feet above the high water mark, I discovered that the quantity of ore was much increased, but instead of the galena, the whole width of the vein is occupied by the sulphuret of iron. As the beach is covered with loose sand and broken masses of rock, I could not ascertain at what rate the lead ore increased in its descent, and I regret that I had not the means of ascertaining, by a deeper examination, what hopes this spot offers for opening a mine. There is another vein of the galena at the head of Harbour De Lute. It occurs here, unaccompanied by the quartz, and carbonate of lime. It is only four inches wide, but of an excellent quality.

There can be no doubt that this ore is connected with several veins, discovered but a few years ago, on the east side of South Bay, and within eight miles of Lubec. I had previously visited that place, at the request of one of the proprietors, and am of opinion that, by a judicious exploration, the ore might be found in sufficient quantities to repay the expense of mining. A small sum of money, properly applied in seeking the lead ore at Campo Bello, might be amply repaid by new discoveries.

These veins of the sulphuret of lead were evidently produced by the heat attending the elevation of the trap rocks, with which, there can be no doubt, they are contemporaneous. The same remark will apply to the sulphuret of iron, always found most abundant near a dike. The lead and iron must have existed previously in the slate, where they were combined with other minerals; but when they were submitted to intense heat, they united with the sulphur, which aided their fusion and fluidity. If it be remarked that these ores are found filling veins in the trap, which is of later origin than the slate, the fact is by no means weakened, for veins and dikes of that rock, often found crossing and entering into each other, shew that it is of different ages, and was thrown upwards at separate periods. An empty fissure in the pre-existing trap, would be as readily injected with metalifareous matter, as one left open in slate.

(To be continued next week.)

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