

ART. VI.—*Geology of a portion of the Labrador Coast, by Lieut. Baddeley, Royal Engineers.*

VERY little is known of either the geology or mineralogy of any portion of the coast of Labrador, and for that little we are almost entirely indebted to the Rev. Mr. Steinhacur, extracts from whose communication on the subject to the Geological Society of London, will be found at the end of this article.

In the autumn of 1827, Capt. Campbell, h. p. 79th Regiment, visited the coast of Labrador, from Bradore to Chateau Bay, and brought back with him the necessary materials for affording the following report, which he kindly placed at my disposal.

On the island of Quirpon, about one hundred yards to the north of Newfoundland, quartz rock was observed, forming a thick continuous vein or stratum running north east. It is remarkably pure, white, compact and deeply translucent on the edges. A tendency to the formation of regular crystals appears in some hollows and nests in the mass.

These crystals when near the external surface of the rock, are often characterized by having beautifully polished faces, as if they had been operated upon by the lapidary's wheel; the same is also observed of some portions of the surface, which exhibit no tendency to regular crystallization. Dr. MacCulloch has noticed the same fact in his paper on Quartz Rock, page 480, vol. 2, of the Geological Transactions.

At Cape Charles, on the Labrador coast, immediately opposite, the same rock was observed, and under similar circumstances.

At Francis harbour, on the Labrador coast, an aggregate composed of quartz and calcareous spar, forms a continuous

seam

seam or thin stratum in micaceous schist, which, according to Capt. Campbell, is common to most of the rocks from Bradore to this place. The quartz of this aggregate projects in ribs, as it were, from both the otherwise flat surfaces of the seam. It is white, translucent and compact. The calcareous spar is also white, but its laminar structure, greatly inferior hardness, and violent effervescence in acid, remove any doubt as to its nature.

The micaceous schist alluded to above, rises in steps to a considerable height from the water; nothing is known of its stratification, but only that it is associated with granite of a beautiful description, composed of white decomposing felspar, silver mica, and grey quartz, the felspar being occasionally stained or invested by a mineral of a brick red colour.

Granite, containing large crystals of black mica, was also brought from an island near Square Island harbour,

A granite, in which the felspar greatly predominates in large crystals of a white colour, was found to be the prevailing rock at Cape Charles, Battle harbour, and lying above one of a sparkling character, (micaceous schist?)

A very siliceous limestone occurs at Bradore. An indurated calcareous tufa, probably derived from the disintegration of the foregoing limestone, is found incrusting pebbles lying in the sea at this place.

A beautiful aggregate, composed of flesh coloured crystals of felspar and green hornblende, a syenite, was observed, forming veins about one foot wide in a rock, which is described as being dark and of a bluish colour, (basalt?)

On an islet called Castle Reef Rock, in Henley harbour, Chateau Bay, a rock, composed of a mixture of felspar of a dark purplish grey colour, a very fusible green hornblende, and grey quartz, occurs, apparently, underlying basalt. The felspar is remarkable for the almost splendid semi metallic

lustre

lustre on the frequently striated faces of the laminae of which it is composed, and strong resinous cross fracture.

The basaltic formation before mentioned, is thus described.

* Upon entering the harbour it has something the appearance of a fortification. The upper portion consists of a mass of amorphous basalt, fifty feet thick, 990 feet long, and 210 feet wide, in its broadest part, which is in the centre. This mass is supported by an aggregation of basaltic columns, the greatest height of which, is 25 feet. The smallest periphery to any one of these is two feet, and largest seven feet six inches. The position of these columns is vertical or nearly so, (not any were observed inclined to the horizon, bent or curved,) and in close contact one with the other. They are jointed at every foot or one foot six inches. They vary in the number of sides. Capt. Campbell saw them of five, six, seven, and eight sides; one he measured was an irregular pentagon of 6 feet 6 inches, in periphery; another he brought home has eight sides (the smallest may perhaps be esteemed only a truncation,) and it is remarkable for possessing the process described by MacCulloch. (pl. 5.)

The base of these pillars is 180 feet above the water; from the former in most places the ground slopes off at an angle of 45° to meet the latter. The method adopted, unaided by the use of instruments, to ascertain the height of this slope, should be generally remembered. Having taken a boat-hook which he found to be 15 feet 6 inches long, Capt. Campbell fixed a cross piece, about six feet in length, at right angles, to one end; then forcing the other, or pointed extremity, into the ground, at the waters edge, he plumb'd the boat hook to ascertain that it was upright. He then ascended the hill until his eye was in the prolongation of the cross piece, when
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* The sketch (pl. 4.) was reduced by a friend, from one Capt. Campbell brought home.

the boat hook was removed to the place where he stood, and the same thing repeated. By ascending in this manner, it took eighteen stations to reach the top of the slope, which multiplied by the height of the boat hook, *minus* the height of the eye (in this case 5 feet 6 inches,) gives a product of 180 feet, which added to 75 feet, the sum of the height of columnar and amorphous basalt, previously measured by dropping a line from the summit, makes a total height above the sea of 255 feet.

In some places the upper part having fallen away, the columns under are left without any other burthen to support than that of their own weight; in these cases it is often possible to push them over with the foot, by climbing up and going behind them. The summit is flat and covered with moss and turf; its shape is oblong, and it is widest in the middle. The columns pass all round, and there is only one way of reaching the summit.

This formation extends to another island to the westward, called Saddle Island, from which, Castle Reef Rock is divided by an arm of the sea, called by the fishermen Castle Reef Tickle. The width of this arm is not more than 120 yards, and its depth is sufficient for the largest vessels,

There is no essential difference in the basaltiform appearance of Saddle Island; the occurrence, however, of three caves, on the side towards the sea, affords, upon an examination of them, strong presumptive evidence that these columns traverse the mountain, and with the same regularity and close juxta position they exhibit on the outside. The deepest of these caverns was found to be 20 yards deep by 15 yards wide in the middle—the floors were strewn with the fragments of columns, and the sides were ornamented by those which their removal exposed to view—the ceiling was as smooth as that of a room but of almost an iron blackness. The thickness of amorphous basalt above was from 30 to 40 feet,

The course of this formation is east and west, and the columns to the westward are of longer dimensions than those to the eastward.

Mineralogical analysis of basalt from the Coast of Labrador.

* Colour, bluish black ; externally it is yellowish brown. Opaque. Structure, compact granular. Fracture, slightly uneven, somewhat conchoidal, it scratches glass, but yields to the knife, Colour of streak light grey. Magnetic before the application of heat—No apparent action in acids. Sp.Gr. 2.9. Before the blowpipe it forms a shining black globule of enamel. A yellowish green mineral, supposed to be olivine, is disseminated in spots through the basalt.†

Extracts from the Rev. Mr. Steinhauer's notes on the Geology of the Labrador Coast.

“According to the descriptions of those who have had an opportunity of contemplating this inhospitable region, it consists almost entirely of barren rocks, towering in craggy eminences, on which even the lichen in vain endeavours to fix a habitation ; for moisture enters the rock with its fibres ; the cold of winter congeals that moisture, and the summer's thaw precipitates the loosened fragment and its tenant to the foot. These fragments mouldering into sand, afford in some places support to a few species of pines, and the annual decomposition of their leaves, stains this earth to the depth of a few inches with a blackish hue. In other spots where the thawing snow occasions an accumulation of water, sphagnum and other mosses form a species of turf, and conceal the barrenness of the land ; but every where the plucking up a tuft of vegetation, or removing the withered leaves, discovers either the bare rock or a bright silicious sand. In several parts of the country the rocks are intersected by chasms running generally in a right line

* The part within the ferruginous band, represented in the plan is modified by the rust of iron.

† A black pumice full of perfectly round pores, was found floating on the sea at Badore.

line to a considerable distance, as if intended to be the receptacle of future veins; the floor, as I am informed, is composed of a different species of stone from the side, and generally of a lighter colour; but I could not, from the description, ascertain whether it was calcareous or not. These clefts when covered with snow in the winter, sometimes prove dangerous pitfalls to the unwary wanderer who does not know how to avoid them by the line of bushes (*vaccinium*, *ledum* &c.) which fringe their margin. Indeed the narrow passages which divide the coast into numberless islands, almost seem to be similar chasms occupied by the sea, few, if any, of those islands being alluvial, but high barren rocks, appearing from the sea like continuous land.

“The highest mountains seem to extend along the eastern coast; the names and situations of the principal, known to the Missionaries, are

The Nachwak chain, about lat. 59°.

The insulated mountain, Tupperlik, (the tent) lat. 58° 15'.

The Kaumayok chain terminating in the high island of Cape Mugford or Grimington, lat. 58°.

The high land of Kiglapyed in lat. 57°.

The Mealy mountains laid down on Lane's survey of the coast of Labrador in lat. 53° 50', and said to be never free from snow; they have not been visited by the Missionaries who now seldom go far to the south of Hopedale.

“With respect to their actual height, little can be said with certainty, but as Mount Thoresby, on an island south of Kiglapyed was ascertained by the officers of H. M. S. *Medusa* and *Thalia*, to be 2733 feet, and the Kiglapyed is evidently higher, yet inferior to the Kaumayok and Nachwak heights, the latter cannot be assumed at less than 3000 feet. This supposition gains additional probability, from the circumstance that the Kaumayok has been seen by Capt. Frazier at a distance of upwards of 30 leagues from land. The mountains to the west of Cape Chudleigh are much lower, and accord-

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ing to the accounts of the missionaries, of a *different nature*, but wherein the difference consists we are unable to determine.

“ From the islands near Cape Chudleigh we have received specimens of large-grained pale *granite*, with garnets. The island of Anmitok (about lat. 59° 30′) is described as consisting almost entirely of a crumbling granite, sometimes mixed with hornblende. The mountains of Nachwak about Nackwak Bay, furnish considerable quantities of * *lapis ollaris* generally of the grey kind, but sometimes of the semi-transparent green variety. The missionaries describe the southern part of the chain, as exhibiting a very singular appearance towards the sea, being composed of alternate layers of black and white rock in a vertical position, which makes the cliff seem striped, the black strata are about five feet in thickness, the white double that breadth. Nulletartok bay, still farther south, and probably near the extremity of the same chain, has been called Slate Bay, from a stratum of slate, which appears there a little above high water mark; from this stratum the travellers write, that an acrid liquid of a strong sulphureous smell, exudes, which seems to indicate an impregnation with sulphuric acid. Below high water mark, in the same bay, they noticed a stratum, which they describe as resembling † cast iron, with a glossy, somewhat reddish, surface, and extremely hard. The north side of the Kaumayok mountains consists of a white stone with black or grey veins resembling ‡ statuary marble, but very hard. Of the productions of the Kiglapyed we have no account, but to the south of this chain the district commences, where the Labrador felspar is found. This stone was first distinguished
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* Potetone, variety of Stealite. Lt. B.

† Magnetic iron? Lt. B.

‡ Quartz rock? Lt. B.

by the late Rev. B. Latrobe,* among a number of specimens sent to him ; it occurs not only in pebbles on the shore, but in spots in the rocks in the neighbourhood of Nain, particularly near a Lagoon, about 50 or 60 miles inland, in which Nain north river terminates. Its colours, darting through the limpid crystal of the lake, and flashing from the cliffs, more especially when moistened by a shower of rain, changing continually with every alteration in the position of the boat, are described as almost realizing a scene in fairy land. The same district produces also the Labrador hornblende, (hyperstene) and a white stone striped with green, which seems to constitute a rock on an island near Nain, and was first noticed by the Rev. C. J. Latrobe, among other fragments, which induced him to cause large fragments to be broken off and brought over.

“One of the mountains in the vicinity of Nain, (as well as several others in different parts of the coast,) exhibits a species of † Mam-tor, continually crumbling away, and shivering down into the valley below.

“The island of Ukasiksalik, free stone island, has derived its name from the quantities of lapis ollaris found there. It is probably the most southern place on the coast where this mineral occurs, as the missionaries who first visited the Eskimos in Chateau Bay, in the straits of Belle Isle, were told by them that they procured the stoue of which their lamps, pots, &c., were made from this island.

“At Hopedale the secondary limestone seems to come in ; at least we have received from that place fragments of reddish carbonate of lime, calcareous spar, and schiefer spar. Mr. Latrobe also possesses a madrepore, said to have been found there. It is remarkable that the river abounds in fragments
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* President of the Society for the furtherance of the Gospel established by the brethren.

† A mountain in the Peak of Derbyshire. Lt. B.