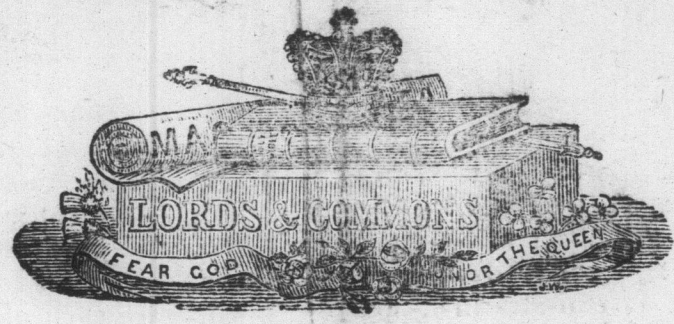


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HEARTS RESOLVED AND HANDS PREPARED, THE BLESSINGS THEY ENJOY TO GUARD.—SMOLLET.

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REPORT ON THE GEOLOGY

OF Newfoundland.

BY
J. D. FOLGER, B. A. & F. R. S.

(Concluded from our last.)

The Geological structure of the district thus described is precisely in accordance with its external features. The chain of hills running from Cape Ray to the back of Cow Head, forms a great anticlinal axis, which in the N. part of its course runs N. N. E. and S. S. W., but S. of St. George's about N. E. and S. W. The central portion of these hills is composed of gneiss, mica slate, chlorite slate, quartz rock, and granite, and from these the superior rocks dip on either hand. It appears, however, that the superior formations flanking these hills are different in different places.—The tract lying on the S. side of George's Bay, between these primary hills and the sea, is occupied by the Newfoundland coal formation. The general strike of these beds is parallel to the coast, or about N. E. and S. W., but about Cape Anguille the beds are broken and disturbed and thence to Codroy strike N. or sometimes N. W. It thus happens that the same beds which form the coast at one part, continue along its whole course, and we are deprived of the benefit of a coast section. In order to get a section of the country we are then driven to the rivers. I ascended Codroy River 10 or 12 miles from the sea, and the brook next above Crabb's River, about 8 miles, from which I got the following results—

The cliffs on the sea shore, and a band of country a few miles in width parallel to it, are occupied by the lower beds of the formation,—the red sandstones and marls, with gypsum. In the cliffs near Codroy Island is much red and green marl, with bands of white flagstone. The white flagstone and the greenish marl contain many veins of white fibrous gypsum, and interstratified with these and the red marls are some thick beds of white and grey gypsum, of a singular character. These gypsum beds are not hard compact sulphate of lime, but are composed of white flakes of that substance, regularly laminated, and interspersed with small flakes and specks, or sometimes thin partings of a black substance, apparently bituminous shale. The whole mass is soft and powdery, thick bedded, and in considerable abundance, and it might be carried away in boats with great facility. I was informed by some Indians of Great Codroy River that they had seen a bed of coal 2 feet thick, and of a considerable extent, some distance up the country.—Their account of the distance, however, varied from 10 to 30 miles; and I could not induce any of them to guide me to the spot. I proceeded up the river about 12 miles from the sea, and some distance beyond the part navigable for a boat, without seeing anything but beds of brown sandstone and conglomerate, interstratified with red marls and sandstones, gradually becoming more horizontal and dipping towards the S. E. I believe, however, that a bed of coal had been seen by an Indian on the bank of a brook running into Codroy River about 30 miles from its mouth, but that the person who saw it was not in the neighbourhood at the time of my visit. About the middle of the South side of St. George's Bay, in the vicinity, of Crabb's River, the lower part of the coal formation, consisting of alternations of red marl and sandstone, strikes

along the coast, the beds dipping to the N. W. at an angle sometimes of 45°.—About 3 miles from the coast, however, an anticlinal line occurs, preserving the same strike as the beds, or about N. E. and S. W. and causing those to the S. of it to dip to the S. E. Thus the rocks which form the country along the coast, to the width of 3 miles, with a N. W. dip again occur to the same or a greater width, according to the angle of their inclination, with a dip to the S. E. before we can expect to find any higher beds than those in the sea cliffs; so that at least 6 miles of country formed of the lower beds, must be crossed directly from the coast, before we arrive at the higher beds in which the coal is situated. (See section No. 16.) In ascending the brook next above Crabb's River I found on the sea coast beds of soft red sandstone and red marl, and half a mile up the brook, red and whitish sandstones, interstratified with beds of marl, chiefly red, but also occasionally whitish, green, or blue; beyond that were beds of marl, containing massive grey gypsum, similar to that at Codroy, and a bed of blue clay, containing crystals of selenite. Similar rocks, with now and then a bed of brown or yellow sandstone, occurred throughout the first 2 or 3 miles, all dipping N. W. at various angles of inclination. Beyond this point the dip was invariably S. or S. E., and for 2 or 3 miles further the character of the rocks was precisely similar to those I had already passed. As, however, the banks of the brook were occasionally low, the section observed was of course not perfectly continuous, and beds which were hidden on one side of the anticlinal line, formed cliffs, and were thus exhibited on the other side. Thus, as I continued to ascend the brook I came on a cliff of red marl, 50 feet thick, with some thin grey soft micaceous sandstone, beyond which were some beds of grey hardish rock, with nodules of sub-crystals line limestone, the banks of the river being likewise covered with a crust, a foot thick, of tula. Some distance above this the red sandstones become more scarce, the color being generally brown or yellowish; grey clunch too, with bituminous laminae was frequent. In one band of brown sandstone a nest of coal with a sandstone nucleus was seen. The shape was irregular and was about 2 feet long. (See section No. 17.) It most probably was a vegetable remain squeezed out of all semblance of its former shape. Over this mass of sandstone there was again a good thickness of grey clunch, and brown or yellow sandstone and conglomerate interstratified with red and brown marl, all dipping gently to the S. E. Over these were some thin beds of red sandstone with red marl, and a little beyond some hard light brown or greyish yellow sandstone with small quartz pebbles; this rock formed ledges stretching across the river, producing a fall of 2 or 3 feet. About 100 and 50 yards above this, on the West bank of the brook, was some grey clunch and shale, on which rested a bed of hard grey sandstone, 8 feet thick, covered by 2 or 3 feet of clunch and ironstone balls, and 2 feet of soft brown sandstone, with ferruginous stains, on which reposed a bed of coal 3 feet thick. (See section No. 18.) The dip of these rocks was very slight towards the South, in which direction the bank became low, as it was also on the opposite side of the River, which prevented my tracing the coal further; neither was the band above the coal high enough to bring in any of the beds over it and thus give its total thickness, since it is evident the portion here seen may be only the lower part of a bed instead of the whole. The quality of the portion thus exposed was good, being a bright caking coal. The distance from the sea shore is about 8 miles; the only harbor, however, is that of St. George, which is about 20 miles from this spot. A few very rude and imperfect vegetable impressions were all I could see in any of these rocks.—Many of the gritstones in this section

might probably turn out good freestones. In the next brook to the East of the one I ascended, was formerly a salt spring, which, however, I was assured had lately become quite dry; but several of the little rills which I tasted in the neighbourhood were brackish. As regards the extent of country occupied by this bed of coal, or others which may lie above it, the data on which to found any calculation are but few. If, however, the upper rocks follow the course of the lower, without the intervention of faults and irregularities, the tract so occupied would probably be an oval, forming the centre of the country, bounded by the sea coast on the North and the ridge of primary hills on the S. From the top of the highlands at Crabb's River this ridge bounded the horizon at the distance apparently of about 20 miles. Allowing half of this width to be occupied by the lower beds the tract yielding Coals would probably be 20 or 30 miles long by 10 miles wide. Gypsum again appears once or twice to the cliff between Crabb's River and St. George's Harbor. The N. side of St. George's Bay, between St. George and Indian Head, is occupied entirely by beds of the magnesian limestone mentioned before, all dipping at a slight angle to the N. N. W. and thus passing under the great mass of shales and gritstones which forms the country about Port au Port. At Indian Head a mass of igneous rocks comes in, but in consequence of the lowness of them and on each side of it, no junction with the surrounding formation can be observed. It consists partly of a hypersthene rock, largely granular, with many small crystals of Labrador feldspar, exhibiting the usual reflected colours; much of it, however, is a hard dark basaltic rock, with imbedded crystals of hornblende. In crossing from St. George's Harbor to the Grand Pond, the country was so covered by diluvial rubbish, and that by moss and woods, that no guess could be given as to the nature of the rocks below, except from the circumstance of some angular pieces of white limestone being found in one of the brook. On arriving at the Grand Pond the cliffs are found to be gneiss and mica slate.—The W. end of the Island, and the main land opposite, is chiefly a chloritic schist; all the centre of the Island however, and the main on each side of it is granite, some of which is white with mien, and some red, with or without hornblend.—The N. end of the Island is conglomerate. (See section No. 19.) Immediately opposite the E. end of the Island, on the N. shore of the lake, are some thick beds of very white rock, dipping in various directions; and just beyond these, towards the N., some cliffs of a bright red colour, apparently red sandstone, but the bedding of which was not discoverable. The violence of the winds and waves would not admit of our small boat approaching these cliffs either in going or returning. Two or three miles E. of them, however the cliffs are composed of beds of red sandstone and marl, passing upwards into brown and yellow sandstones and conglomerate of small quartz pebbles, interstratified with beds of brown, yellow and blue marls clunch and shales, and dipping at various angles of inclination, but generally moderate ones, towards the N. or S. E. This series of beds is precisely similar to that previously described as forming the S. side of St. George's Bay, and it forms the cliffs of all the shores of that part of the lake E. of the Island. Its general dip is N. E., and the angle of inclination becomes less as we recede from the granite and primary rocks; and in the bed of a small brook, at the N. E. corner of the Pond, were found various pieces of coal; and at one part, where the bank was newly fallen, the following section was exposed:—

	Ft.	In.
Sand and Boulders	10	0
Softish grey and yellowish sandstone	5	0
Ditto ditto shaly	1	0
Coal (some part like canal		

Coal	0	6
Yellow clunch	0	2
Grey sand	2	0

All these beds dip at an angle of 30°. to the S. E. Large pieces of coal were found in the head of the brook, which is rapid and rocky above this point, showing that more beds exist; and one Indian of St. George's Harbor assured me he had seen a bed three feet thick, in the brook below this point, about three years ago. This was probably true, as I saw many banks in the same brook where such beds might have appeared, but which were then covered with wood and rubbish that had fallen from above.

It thus appears that rocks containing beds of coal are those last observed to dip towards the wide level tract mentioned before as existing N. E. of the Pond, and that as they approach that tract the beds become more horizontal and regular. It is therefore highly probable that coal may be found over the whole or greater portion of it. Its extent I do not know, but some low hills which appeared in the distance were said by the Indian to be at the head of White Bay. It is evident that should a Coal country be found to stretch from the Grand Pond to the Bay of Exploits or Bonavista Bay, its value will be much greater than the strip of coal rocks along the south side of St. George's Bay.

Between Cape St. George and the Bay of Islands the cliffs are chiefly composed of shale and gritstone, dipping in various directions. At the entrance of the Bay however, a group of precipitous hills strike the coast from the S. E. and forms the lofty headlands round Lark and York Harbors—These headlands are composed of igneous rocks of various characters. They are partly a sienitic compound of quartz and hornblende, which passes into a greenish rock, full of red veins, and having the appearance of a conglomerate till closely examined; other portions are a dark compact greenstone, which contains sometimes masses like a pepperino, or volcanic grit. Before entering Humber Sound, I observed a few beds of red sandstone, resembling that of St. George's Bay, and near it some dark bituminous shale, but the relations of the two were not clearly exhibited. From that spot nearly to the head of the Humber Sound, all the rocks consisted of dark shale and grey gritstone. These beds, as before described under the name of the Port au Port shales and gritstone, much resemble the Bell Isle shale formation on the East of the Island. Their position in Humber Sound is irregular and broken. They dip various ways, frequently at high angles; a Westerly inclination, however, being the most frequent. Some beds of a red color were observed, but what place they occupied in the series it was impossible to determine. The most irregular contortions occasionally shewed themselves; the beds of shale being puckered up into angles like a vaadyke border. From this broken condition of its beds, it is impossible to form an estimate of the total thickness of the formation with say degree of accuracy; it occupies, however, the whole length of the Humber Sound. Or approaching the head of the Sound, the dip of these shales and grits becomes more regular, being always to the W. Their positive junction with the next formation is no where seen, as the only section, that of the cliffs on the North side of the Sound, is interrupted by a low band of loose sand, 300 to 400 yards across. Just beyond this we come to the Humber limestone, dipping regularly W. and therefore passing underneath the shale and grit. The limestone formation has been already described, as respects its mineral character. It only remains therefore to state, that whenever its dip could be seen, it was invariably W. at difference angles. The hills composed of it run nearly N. and S. for a considerable distance. About 3 miles up the Humber River, its lowest portion, in which no appearance of bedding is dis-