The Star AND Conception Bay Journal.

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

VOL. V. WEDNESDAY, MARCH 4, 1840. No. 294

HARBOUR GRACE, Conception Bay, Newfoundland:—Printed and Published by *JOHN THOMAS BURTON*, at his Office, opposite the MARKET Place

December, 1839.

REPORT ON THE GEOLOGY OF Newfoundland.

BY

J. B. JUKES, B. A. & F. G. S.

(Continued from our last.)

3.—We come now to Trinity Bay. In this district we entirely lose sight of the St. John's slate formation—its western boundary running down the middle of the peninsula between Trinity Conception Bays. Of the Signal Hill sandstones, too, I cannot undertake to affirm the existence further than from Breakheart Point to Old Perlican; though at the same time it is perfectly possible that what I have called the Trinity Bay sandstone may be only the upper part of that formation of which the Signal Hill sandstone forms the lower beds; and that thus this latter rock, and even the St. John's slate, may be again visible on the West side of Trinity Bay. From Salvage Point to Heart's Content the coast is entirely composed of beds belonging to the Trinity Bay sandstone formation, consisting of alternations of dark red or purple gritstones and sandstones with thin beds of slaty rock. The beds strike along the coast, or about N. E and S. W. and dip invariably to the N. W. at an angle of about 50° or 60°.—Between Heart's Content and Heart's Desire these beds gradually trend round, and eventually strike into the country towards the S. E., and at the head of the harbour of Heart's Desire dip to the S. W. beneath the variegated slate formation. The variegated slate formation occupies the *whole* coast and a good breadth of the interior, from Heart's Desire to the head of Dildo Cove. Along the whole of this tract it is traversed by various anticlinal and synclinal lines, running nearly N. E. and S. W., and thus causing the rocks to dip alternately N. W. and S. E. Between Long Point and Witless Bay is one interesting locality, where in a hollow of the variegated slate rocks, reposes a mass of beds of slate and gritstone belonging evidently to the Bell Isle formation (See section No. 5.) The gradation from one into the other is here perfect; the upper beds of the variegated slate pass into a grey gritstone, with fine grain, but devoid of cleavage; these, as we ascend become separated by thin beds of shale, the thickness of which continues to increase, and that of the gritstone to diminish, until the whole is crowned by a mass of slate without any gritstone whatever. (See section No. 6.) What makes this locality still more remarkable, however, is the fact of the slaty cleavage being developed in the beds of slate themselves. These beds, which are curved up at a high angle on either side, are finely laminated, and they split as easily as any shale along their planes of lamination; but they are also traversed by a fine cleavage preserving a constant angle of nearly 90° to the horizon, and having the same strike as the beds.—The shale is thus minced as it were into small scales or little narrow chips, being cut *thin* by the lamination, *narrow* by the cleavage, and too fragile to retain any *length* in the direction of the strike of the beds. The lower surfaces of the gritstone beds alternating with the shale are likewise traversed by the cleavage for an inch or so upwards, as they break or decompose into sharp jagged edges.—These gritstone beds scarcely differ in fineness of grain from the whole mass of those composing the variegated slate formation in which the slaty cleavage is perfectly developed. About half a mile S. of this spot, in a small cove opposite Red Rock, among some beds of the ordinary red slate, I observed a band of red calcareous rock, traversed in every direction by small strings of carbonate of line, looking like fragments of shells, and containing concretionary balls of grey crystalline limestone. Underneath this was a pinkish yellow concretionary rock, with veins of carbonate of lime, and small balls of ironstone. The thickness of these beds was about 15 or 20 feet, and they are capable of being burnt into lime. I did not succeed in discovering in them any decided organic remains, though some of the markings were like faint impressions of shells.

At Dildo Head some beds of shale again appear resting on the variegated slate rocks which rise up from underneath the shale towards the S., and continue to dip to the N. W. to the head of the Cove, where the lower beds of the formation begin to shew themselves. Returning from the head of Dildo Cove, which forms the extreme southern point of Trinity Bay, we find the variegated slate formation still forming the coast through Spread Eagle, Long Cove, and Collier's Bay, down to Tickle Harbour Point, having on the whole a N. W. dip. On each side of Chapel Arm the undulations in the slate rocks are frequent pitches of shale resting here and there in their hollows, but there sides still remarkably preserving the usual inclination towards the N. W. and S. E. On entering Chapel Arm we come immediately on igneous rock. This is for the most part a rather largely crystalline greenstone, its texture however sometimes varies into a nearly compact basalt. It is frequently marked with circular bands in relief, of some inches in diameter; these are sections of spheroidal concretions which are not however sufficiently developed to be detached from the mass, and the nucleis of which are of the same character as the rest of the rock.

On the W. side of Chapel Arm the variegated slate rock abuts against the greenstone without undergoing any apparent alteration, except that its colors become fainter, and that the red beds lose that hue entirely as they approach the igneous rock. This change of color, however, takes place sometimes where no igneous rock is present. On the E. side of Chapel Arm patches of shale and gritstone rest upon and have been caught among the greenstone, and are of course greatly altered from their original characters. The shale is hard, brittle, and rings with a metallic sound, and the gritstone is almost crystalline in texture, and in places joined so as to assume an irregular columnar form. The greenstone does not come out upon the coast in any other part, but it spreads a good way in the interior, the hills called Spread Eagle Peak, Old Shop, and the Tolt, being certainly composed of the greenstone and its cognate rocks. Passing round the extremity of Tickle Harbor Point, we find the upper beds of the variegated slate formation dipping regularly under the Bells Isle shale and gritstone, which occupies the whole of the West side of this long headland up to Tickle Harbour. Not far from the extremity of the point the shale contains a great bed of conglomerate 30 or 40 feet thick, of a light grey colour. The pebbles consist of white quartz, are seldom larger than walnuts, and are compacted together by a grey cement which is slightly calcareous. In the cliff at this place is seen a very neat example of a fault, and of the effects which is sometimes (though perhaps rarely) produced by a fault on the surface of the ground. (See section No. 7.) In Tickle Harbour an entire change takes place in the rocks forming the surface of the country, produced probably by a great fault, but the exact nature of which cannot be ascertained by reason of the lowness of the land and the want of a continuous section. A mile or two W., however, of Tickle Harbor, the cliffs again commence, and the first thing seen is a mass of serpentine with some impure stealitic and a yellow quartz rock containing crystals of feldspar. Over these, which are not above 20 or 30 yards across, is an ash-colored slate, then a dark purple slate, then a slate with a brown stripe, surmounted by a grey slate, the whole having a thickness of 400 or 500 feet, dipping N. W. and passing upwards into a grey mass of alterations of slates and gritstones, forming what I have called provisionally the Trinity Bay sandstone formation. This formation, which in its upper parts consists entirely of thick beds of hard sandstone and conglomerate, occupies the whole coast from the Bay of Bulls to Trinity Harbor. Its prevailing dip from Bay of Bulls Arm to Bonnaventure is N. W. at various angles of inclination, and thus it shortly passes in that direction under the variegated slate formation. These latter rocks come in at the head of Bay of Bulls Arm, and form a band of country running thence by Centre Hill to the middle portion of Random Island about Hickman's Harbor, and striking from the Island across Smiths Sonnd into the mainland W. of Pope's Harbo.—From under this band of variegated slates, however, the Trinity Bay sandstone again arises to the W. and in Random S. W. Arm continues to rise to the W. or dip to the E., until at the head of the Arm its lowest beds come out to the surface, and we have the same slate rocks appearing underneath them which I mentioned before as occurring near Tickle Harbor. In Random Island, however, this is not the case, as the Trinity Bay sandstone, after rising to the W. from under the variegated slate formation, very soon arches over, dips again to the W., and so passes under another band of the variegated slates, which, as they also dip rapidly to the W. shortly become covered by the next superior rocks, the Bell Isle shale and gritstone. (See sec. No. 8.) The shale and gritstone occupies all the N. W. corner of Random Island, and a considerable tract on the mainland opposite. This tract is low and level, and is bounded to the W. by a range of hills, some spurs of which strike the coast opposite the W. side of Random Island, about one mile S. of the bar which nearly connects the Island with the main. The rock of which these hills are composed is a red sienite, very similar to that which occurs in some places at the head of Conception Bay. The junction of the sienite, with the shale and gritstone, is at one place clearly exposed; it partly overlies those rocks which dip slightly towards it, and abut against it. The shale near the junction is indurated, and the gritstone more than usually hard and of a simi-crystalline texture.—(See diagram No. 9.) In several other points at the extreme head of Random Sound, masses of a dark grey schistose rock may be observed resting on or entangled in the sienite, but there is no evidence to shew to what formation they belong. The sienitic rocks have apparently a very extensive range in the interior, as the same chain of hills runs beyond the extremity of Random S. W. Arm for some distance; they do not however, appear elsewhere on the coast. The variegated slate rocks both in Random and Smith's Sounds have some remarkable localitis. In one part of Smith's Sound the variety of color is very great,—bright red, dull red, cream color, deep brown and green, alternating with each other. The cream colored portion is rather calcarious. In Random Sound, near Hickman's Harbor, a bed of white crystalline quartz rocks, 15 feet thick, is apparently interstratified with the red and green slates; and some distance above it two thinner beds of a similar character appear. The whole is in a highly inclined position, but not contorted, and the beds of quartz preserve a regular thickness for several hundred yards.

From Pope's Harbour to Trinity Harbour the country is composed of the Trinity Bay sandstone one anticlined line only occuring in this tract.—This line passes through New Buonavonture and runs thence into the country in a N. N. E. direction. To the W. of this line the rocks dip W. N. W.; to the E. of it, or along the coast, the dip is E. S. E. at various angles of inclination. Between Trinity Harbour and Robin Hood's Bay the beds are perpendicular for a short distance, but afterwards recover their Easterly dip, and in Salmon Cove are nearly horizontal.

The detached Islands about the mouth of Smith's Sound are composed of a red and grey fine grained gritstone, belonging, I believe, to some part of the variegated slate formation. Some of the beds on these islands would make tolerable building stone. Just E. of British Harbour (called also Shutsin Harbour) a great trap dyke comes out upon the coast cutting through the gritstone beds without producing in them any sensible alteration. This dyke is two or three hundred yards wide, and is very interesting. Near its sides the rock is vesicular, nearly black, and precisely resembling modern lava; approaching the centre it becomes compact and of a dark grey, and part of the very central portion is columnar. The part in which the columns are best developed is about 20 yards wide, forming a nearly perpendicular band slightly curved. The columns are small and irregular in the number of their sides.—They are nearly horizontal, and are divived by 3 or 4 perpendicular beds as it were. In the two outside beds the columns are slightly bent; those on one side downwards, those on the other upwards. (the section No. 12 will make this description more clear.) North of the principal dyke two or three smaller ones occur, cutting through the gritstones without disturbing them.

Concerning the relative age of the rocks of Trinity Bay, it it clear that the greenstone and sienites are the most modern; and from the mass of sienite to the W. of Random Islands forming hills which seem to keep a nearly N. and S. direction, it is probably that to the outburst of that sienite is due the dislocations affecting the stratified rocks which have likewise an approximate N. and S. direction,—or at all events that the outbreck of the sienite and the dislocation of the rocks was simultaneous. It would appear also that the variegated slate rocks are conformable to the Trinity Bay sandstones; but as I have not yet traced any gradation of one into the other, their continuity is uncertain. How beneath the Trinity Bay sandstones we have seen that slate rocks shew themselves both in Tickle Harbor and the head of Rundom, S. W. Arm, and it thus appears probable that this series may represent or contain what I have called the Signal Hill sandstone and St. John's slate formation. To this latter, however, the variegated slates have been shewn clearly unconformable in Conception Bay. In the absence of all organic remains, and the want of a good continuous section, the distinctness or identity of two formations can never behold as proved by mineral character along; I have therefore left the question open for future evidence to decide.—Such evidence I hope to get, early in the next spring, at the head of St. Mary's Bay.

The external characters of Trinity Bay are distant and well deserving of notice. In those parts occupied by the Trinity Bay sandstone formation the land is high and the cliffs bold, the summits of the hills however are not craggy, and their outline is tame and regular. The country is generally thickly wooded, but the trees are not remarkable for size, and the fertility of the soil is not striking, though in sheltered situations it appears of an average quality. The great difference between these rocks and the variegated slate formation, in the character of the country which they compose, is obvious about Heart's Desire and in Random Island.—In each case the tract occupied by the variegated slate is low and level. The improvement in the size of the trees is great, and wherever a spot has been cleared of trees and moss, or a strip of ground along the sea shore is naturally so unincumbered, the soil is clothed with a rich pasturage of bright green grass, sometimes scattered with wild clover. The tract between Heart's Desire and Dildo Harbor would amply repay the labour of cultivation, as pasture land certainly, if not as arable, were but a good road once opened to the capital; and it certainly seems a pity that such a space should be left unused as would be fully able to supply the most populous part of the Island with the common luxuries of fresh meat, butter, milk and eggs, leaving out of the question the great resources that would be thrown open to a part at least of the laboring population. The tract about the N. W. corner of Random Island is perhaps too remote from the mass of the population to be at present valuable as an agricultural district; otherwise the whole of the ground formed by the variegated slates and Bell Isle shale formation, from the size of its timber and the patches of grass, is evidently of good quality, and able, if opened, to support a much larger population than is now to be found on the neighbouring shores. The hills about the head of the Bay, around Chapel Arm, and which are composed of igneous rocks are remarkably distinct in appearance from the other high lands which surround the Bay; they are detached from each other, and have a peaked and serrated outline; they are clothed with wood, but not I believe of a quality better than ordinary. The sienite hills W. of Random Island are likewise immediately to be distinguished by their peaked and decided outline from the heavy forms of the gritstone ridges. One detached hill, however, composed of the sandstone rocks, lies between Bay of Bulls Arm and Deer Pond. It is called Centre Hill, and is upwards of 1000 feet in height. It is a fact remarkably characteristic of the way in which this country is covered with water, that from the summit of this hill I counted 152 "ponds," varying in breadth from 20 or 30 yards to about a mile, none of which were at a greater distance than 8 miles from the foot of the hill. The cliffs around the entrance of Random Sound are very striking; the immensely thick beds of gritstone forming smooth perpendicular walls of great height above and depth below the level of the sea,—a large block or ledge here and there jutting out to support a stunted fir, and an occasional mass of ruins affording an uncertain landing at their foot

I have drawn section No. 10 from Shoal Bay, around the head of Conception Bay and Trinity Bay, to the country S. W. of Random Island, by way of exhibiting, in a connected form, some of the facts mentioned above. It does not aim at giving more than the rudest imitation of the outline of the country, with little regard to proportion. The contorted position of the St. John's slate is given from analogy, as I have never actually traversed the country between the head of Conception Bay and the E. coast.

4.—I had been so long detained by contrary winds on the Western part of the Island that the only places I was able, on my return, to visit in Placentia Bay, were St. Lawrence, Mortier, Audierne, & Great and Little Placentia. From what I saw in passing from one to the other, and from what I gathered from different accounts, I am enabled to state that the principal formation of Placentia Bay is the variegated slate. In the neighbourhood of Great & Little Placentia the rocks are chiefly a dull red and green compact slate rock, but devoid of slaty cleavage, evidently the lower beds of the variegated slate forma-