The Star AND Conception Bay Journal.

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

VOL. V. WEDNESDAY, FEBRUARY 12, 1840. No. 292

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

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[*Laid before the Legislature by command of His Excellency the Governor.*]

IN the present state of Gelogical science, an observer commending an investigation of a country at a distance from those which have been already described, is very much in the condition of one who begins the science afresh. The nomenclature and classifications with which he has been familiar, have to be discarded, or at all events held as of uncertain application to the things he has now to examine; and instead of tracing and mapping down a series of rocks the order of which is known and in which the identification of one affords a ready clue to the interpretation of the rest, the Geological Surveyor has to labour at long, uninteresting and perplexing details, in order to acquire the preliminary knowledge with which to begin his work. If to these consideration be added that of the difficulties arising from an uncleared country and a dangerous coast, increase, during the latter part of the season by unfavourable weather, I hope the small part of the Survey which has been completed during the past summer, compared with what I had expected to accomplish, will be sufficiently accounted for.

The best form into which the materials collected can be thrown, will, I think, be —first of all, a general account of the different formations met with in the course of the survey,—and then a sketch of the portions of the country occupied by each, their local varieties, and their relations one with the other. As I have not yet been able to connect the Eastern and Western sides of the Island, I will describe them each separately, as far, at least, as regards the stratified rocks And inasmuch as any names which can be given to the several formations must be for the present provisional, and I wish by all means to steer clear of that fruitful source of error, hasty generalisation, I shall apply to the different formations names derived either from those places near which they are best exhibited, or from some obvious and general character.

STRATIFIED ROCKS OF THE EASTERN PART OF NEWFOUNDLAND.

(In the descending order.)

1.—The Bell Isle shale and gritstone formation.—This formation is the newest or highest in the series of stratified rocks on the Eastern side of the Island. It consists of a great mass of dark brown and black shale, interstratified with beds of a fine grained gritstone. The shale is of various degrees of hardness, sometimes crumbling beneath the finger and in very thin laminæ, at others in thicker plates, requiring a sharp blow to break them.—It is frequently micaceous, and some portions of it put on precisely the appearance of some mica slate, having a curved or wrinkled lamination, and being entirely composed of scales of white silvery mica. Some slabs of this shale are covered with singular markings in relief, at first sight resembling the leaves and branches of small plants or sea weeds; they are, however, I believe, concretionary, and not organic. The sotter parts of the shale frequently decompose in situ into a dark brown earth, which lodges in the crevices and on the ledges of the cliffs, and has precisely the appearance of fine vegetable mould. The beds of gritstone which occur at various intervals in this mass of shale, are universally fine grained, grey internally but weathering brown outside, generally thin bedded, being rarely more than two feet thick, and are divided by joints into sharp angular blocks. These joints are almost invariably at right angles to each other, and when also perpendicular to the beds, the blocks are of course rectangular, and form good building stone. If not thus naturally square, however, the stone will not readily admit of being made so artificially, as it is of a brittle splintary character. In the upper part of this formation, the shale, is much more abundant than the gritstone, which latter frequently occurs in single beds, with regular intervals of shale between each; in the lower portion the beds of gritstone are more grouped together, forming a thickness sometimes of 20 or 30 feet, and the shale bears a less proportion to the stone than in the upper part. The thickness of the whole formation must be considerable; but owing to the want of a continuous section, and other difficulties, it must be felt to conjecture. It cannot, however, be so little as 600 feet. The Bell Isle, shale and gritstone is in some places seen to graduate or pass down by regular degrees into the next inferior, or that which I shall term the variegated slate, formation. One formation is said to graduate downwards or upwards into another, when at their junction the beds of each alternate the one with the other, and no positive line of separation can be drawn between the two.

2.—The variegated slate formation consists of a mass of rocks the most remarkable and abandant of which are some bright red and greenish grey slates. The upper part of this formation is almost invariably of a very fine grain, but here and there contains coarser beds, or even patches of small conglomerate. The fine grained beds are generally traversed by a slary cleavage, but from their brittle character seldom split into large slates, and are never sufficiently durable to be used for economical purposes. Some of the beds are slightly calcareous. The bright red colour generally characterises certain beds, each bed or group of beds being only of one hue; sometimes, however, a sudden change takes place, the red colour ending in one or more broad streaks, and the remainder of the mass being greenish grey. The colours are likewise in variable proportions in difference localities; the predominating hue being red in one place, green in another and becoming in some places, brown, cream-coloured or yellowish. The slaty cleavage is most frequently developed in the upper part of the formation; the lower beds though retaining something of their characteristic colouring, are rather coarser, more siliceous, and become compact slate rock or gritstone.—The total thickness of this formation must certainly exceed a thousand feet.

3.—The Trinity Bay sandstone formation —This is the rock which most usually occurs next below the variegated slates; I cannot, however, as yet state, whether the two pass into each other or not. —The Trinity Bay sandstone formation is composed of materials of which the following section is an example:—

	Feet
1.—Dull red sandstone, or gritstone, containing a few pebbles, in enormously thick beds, some being so much as 30 or 40 feet.	400
2.—Alternating beds of coarse and fine grained rock, the finer beds exhibiting an imperfect slaty clearvage, and the beds generally very thin, sometimes not more than 3 inches.	400
3. Dark red sandstone, Light purple do. Dull red sandstone and conglomerate. Gritstone with a dull red and white stripe.	150
4.—Greenish slaty rock	50
5.—Dull red sandstone and conglomerate.	100
6.—A continued alternation of beds similar to 3, 4, and 5, for a thickness of at least 500 or	600
	1700

These gritstones and sandstones are generally hard and intractable, having a dull fracture and being not well adapted for building purposes. The slaty beds are siliceous and the slaty cleavage imperfectly developed, the whole series being characterised by as few features of interest as can well be imagined.—It seems somewhat to change in the nature of the conglomerate beds in some places, as great masses of a grey colour, with small red pebbles imbedded, were observed belonging apparently to this formation. As we descend to its lower beds moreover the quantity of the slaty rocks increases.—From these two circumstances it may happen that the Trinity Bay sandstone formation may be identical with the rocks I shall mention next. As however there is no direct evidence, except mineral character, in favour of this supposition, and some circumstances seem to militate against it, I shall describe these rocks separately.

4.—The Signal Hill sandstone and conglomerate.—This formation consists of a group of rocks generally of a dull red colour, very hard and intractable and thick bedded. Its upper portion is principally a coarse grained sandstone frequently containing beds of conglomerate of quartzose pebbles, some of which are as large as a man's fist. In the lower part the conglomerate is generally smaller and it is interstratified with masses of a very fine grained gritstone of a light grey colour, hard and splintery, the beds of which are commonly very thick, and in a limited section scarcely discerrible. This grey stone may be seen at Quidi Vidi, Signal Hill, and the base of the South-side Hill of St. John's. It is there used as a building stone, but, like the gritstone of the Bell Isle formation, its utility for that purposes chiefly depends on the direction of the joints which traverse it, as it is difficult to trim it into shape.—From all parts of the formation large square blocks might be frequently obtained fit for the construction of piers or breakwaters, or for similar purposes. The thickness of the formation or of that part of it exhibited near St. John's, must be about 800 feet.

5.—The St. John's slate formation.—The gradation downwards of the Signal Hill sandstones into this formation is perfect. At their junction beds of dull red and greenish fine grained gritstone alternate with each other, passing upwards in to a coarser red sandstone and downwards into a compact greenish rock, that gradually acquires a slaty cleavage, and assumes all the aspect of clay slate. This slate formation varies considerably in character in different beds, and it is possible that the beds themselves may very in different portions of their course. They are sometimes very thin, and split easily along the lines of stratification; in this case the cleavage is frequently absent, or if present its plane appears generally to cioncide with that of the stratification.—Other beds, again, are very thick,—the marks of stratification being confined to those bands of colour technically called the stripe, and having a fine cleavage crossing them at various angles and splitting them into large and excellent roofing slates.—The colour of these rocks varies from a greenish hue to a dark blue or that which is commonly understood by slate colour. The thickness of the whole formation cannot be ascertained, as I do not know that I have anywhere seen the base of it; that part which is exposed, however, must be 2 or 3000 feet thick.—It is the lowest stratified rock any where to be seen on the Eastern side of the Island.

STRATIFIED ROCKS OF THE WESTERN PART OF NEWFOUNDLAND.

The series of stratified rocks on the western shore of Newfoundland is very different from that of the Eastern side. It consists of four or five formations, in the following order—

1.—The Newfoundland coal formation.—This interesting and important group of rocks resembles in its higher portions the coal formation of Europe and consists of alternations of shale and clunch, with various beds of gritstone, and hers and there a bed of coal. Interstatified with those rocks, however, there occur in Newfoundland beds of red marl; and as we deseend to the lower parts of the formation, there come in alternations of red and variegated marls with gypsum, dark blue clays with selenite, dark brown conglomerate beds, and soft red and white sandstones. This inferior portion of the Newfoundland coal formation so greatly resembles the new red sandstone of England (which in that country lies over the coal formation,) that it was not till I got the clearest evidence of the contrary that I could divest myself of the prepossession of its being superior to the coal in this country also. That nothing might be wanting to complete the resemblance, a brine spring is known to rise in one spot on the South side of St George's Bay, through the beds of red marl and sandstone. It is certain, however, that in Newfoundland the beds containing coal are above these red marls and sandstones, with gypsum and salt springs, the whole composing but one formation, which it is impossible to subdivide by any but the most arbitrary line of separation. The total thickness of this formation must be very considerable I by no means have any reason to suppose that I have as yet seen its highest beds while the thickness of those which I have been must amount altogether to at least one or two thousand feet.

The group of rocks which I believe to be next below the coal formation, is one that I shall call—

2.—The Port au Port shale and gritstone.—This is a very large formation, something similar in character to that which on the Eastern side of the Island I have called the Bell Isle shale and gritstone; and it is perfectly possible that the two may be different portions of the same beds. The Port au Port body however are not so regularly bedded as those of Bell Isle; the shales are less micaceous and more sandy, and many of the gritstone beds are laminated and echistose. The total thickness of the beds seen must exceed 1500 feet.

3.—The Humber Limenstone.—This group of rocks lies below the Port au Port shales and gritstones, and in the Bay of Islands it is the one *next* inferior; as however their junction was not exposed I cannot say whether the one graduates into the other, or whether other beds may not be interposed between the two in other localities. The highest part of the Humber Limestone which was visible, was a thin bedded mass, about 30 feet thick, of a hard slaty limestone of a dark grey colour, with brown concretions that, on a surface which had been sometimes exposed, stood out in relief. Below this are some thin beds of hard subcrystalline limestone, the colours of which are white or flesh-coloured with white veins.—These would take a good polish and would make very ornamental marbles, and from the thinness of the beds are especially adapted for marble slabs. This series of beds has a thickness of about 200 feet. Below these are a few feet of similar beds of black marble, which rest on some grey compact limestone, with bands or thin beds and