

Atlantic coast being unknown in the interior or on the Bay of Fundy shores, where the rich alluvial soil gives nourishment to a more luxuriant vegetation. In the valley of Annapolis, during the past summer, I had an opportunity of observing during a stay of only two days the very great dissimilarity of its insect fauna compared with that of the neighbourhood of Halifax. With the exception of *Lycæna Americana*, and one or two *Hesperians*, I did not observe about Annapolis itself, any of our more common species, where *Satyrus alope* and *Erebior nephile*, species never seen with us were extremely abundant. I feel certain that it only requires more thorough investigation to render this distinctive character more apparent. The North Mountain if traversed from Digby Neck to Blomidon, would probably afford many rare if not new species.

ART. III. ON THE COPPER AND NICKEL MINES AT TILT COVE,
NEWFOUNDLAND. BY ELIAS MARETT, ESQ.,
ST. JOHN'S, NEWFOUNDLAND.

(Read December 12, 1870.)

TILT COVE, situated on the north side of Notre Dame Bay, and about ten miles south of Cape John, a mere notch in the sea wall, has nothing particular to distinguish it from any other similar indentation on the same coast line of rugged lofty cliffs capped with a growth of stunted spruce and fir trees. A wharf and a few fishermen's huts are alone visible on first approaching the landing place. A few paces, however, across a narrow neck of land, suddenly conduct the visitor into the midst of a busy thriving town, which until lately, was part of the unreclaimed wilderness. This is the now notable mining centre of the "Union Mining Company."

The almost sudden transition, from a wild rock-bound coast, to a neat, clean, and orderly town, is as pleasing as it is unexpected. The town is built on the sides of a bowl-shaped hollow, the centre of which is occupied by a lake, at the foot of lofty precipitous hills, which completely encircle the place and shut out all view of the sea

or surrounding country. The Mine has been opened within the last five or six years, and operations pushed forward with a vigour and energy almost incredible. Before the opening of this mine, "Tilt Cove" was inhabited by only a few fishermen and their families; now, it contains a population of some twelve hundred people, all connected with, or dependent on the works. Roads had to be made in all directions, tramways laid down, wharves and bridges built, dwellings, stores and workshops erected—everything, in fact, had to be done to redeem from the wilderness a place suitable for habitation and adapted to the exigencies of trade and commerce. The settlement is now one of the most, if not the most thriving of any in the colony. There is a resident doctor, a clergyman (the Rev. J. Lockward) and a school master; a new church—one of the handsomest and most substantial wooden buildings I have ever seen in the colonies, has been erected for the benefit of the inhabitants, by the liberality of the proprietors. The police is admirable and order and quiet reign throughout.

The mine was opened in 1864, and the progress has been so rapid, that, in 1868 not less than eight thousand tons of copper ore were shipped to the mother country; last year (1869) about six thousand tons were despatched; the decrease in the quantity exported does not imply any diminution in the amount of mineral brought to the surface, but rather was occasioned by the state of the home markets. At all events, the deficiency was amply made up by the discovery of a rich vein of Nickel, greatly exceeding the value of the copper, and of which thirty-three (33) tons were shipped last year. In the present year, eighty (80) tons of Nickel have been exported, and during my visit, from seven to eight hundred tons of copper ore were despatched to England; while at the time of my departure, one vessel was loading at the wharf and two others were awaiting their turn. In order to avoid error, I ought, perhaps, to mention that the "copper" does not exist in veins but in deposits, technically called by the Cornish miners "pockets" or "bunches." The copper is shipped either crushed, washed and culled, or only broken and culled, then transported to the ship's side in waggons containing nearly two tons each, by means of a tramway on a slight incline, in a rapid and expeditious manner. The crushing is

performed by means of a powerful steam engine. A difference is observed in the washing of the copper and of the nickel ores. The former are cleaned and culled by the process of jiggging, but the finely crushed Nickel is washed and picked out by means of a graduated sluice, very much in the same manner as the gold washings; when dry, it is then barrellled up ready for exportation. I was told that thirty tons of this valuable mineral were then ready for shipment. The proprietors, Messrs. Bennett & McKay, are said to have shared, after deducting all expenses, £32,000 of profits between them, for the year 1868. Now that they have all the plant, and with the Nickel vein in full operation, it would be difficult to say how much more important the future results may become. It is said that an offer of £200,000 was made for the Mine by a London Company, which was declined.

The Geological Surveyor, Mr. Murray, says in one of his reports: "It would be difficult to imagine a place more conveniently situated for the commencement of mining operations than this at Tilt Cove. The lofty vertical cliffs which rise on every side give unmistakable evidence of the presence of mineral wherever it exists; which, were the ground of a more rounded or gentle character, would necessarily be more or less concealed. All the work hitherto done has been carried on in drifts at a higher level than Windsor lake, thereby avoiding all necessity for pumping-engines, or danger from inundations; while the position of the place, by its proximity to the sea, for embarking ore, is in the highest degree advantageous. The rock with which the ore is immediately associated appears to be a chlorite slate, very ferruginous, with seams of serpentine, and having huge intercalated masses of a hard, compact, greenish-grey crystalline rock."

Perhaps the most remarkable feature of Tilt Cove is the Nickel vein. This is situated in the midst of a ferruginous hill, directly facing the settlement, and which might, without stretch of imagination, be taken for an enormous mass of rusty iron, the refuse of cyclopean furnaces.

The whole of the peninsula of "Notre Dame" is highly metalliferous, and is almost entirely taken up by adventurers holding mining licences, or rather licences to search for minerals

within certain prescribed limits. Everywhere along the sea cliffs indications of copper and iron are plainly visible, cropping out among the serpentines, which are exceedingly beautiful and varied.

If a line were drawn across the Island from Notre Dame Bay to Cape Ray, the territory lying to the north and West of that line would represent the metalliferous region of Newfoundland, at least, so far as is yet known. The government survey is now in full operation, and the surveyors are this year working their way across the Island from Bay of Despair to Notre Dame Bay.

A few miles from "Tilt Cove," a second Mining Company—that of "Notre Dame," has commenced operations, but as the mine has been opened only within the last twelve months, the works are much less extensive; though the prospects seem not inferior to those of the Union Mine. There are several other places where workings have been commenced on a small scale, but either from lack of enterprise or of capital, the results have not been fortunate and the works languish.

There can be no doubt that the results of the geological survey will reveal much that is both valuable and interesting, and hitherto unsuspected, and will attract to the colony that which it stands so greatly in need of—enterprise, capital, and population. With failing, or, at the best, uncertain fisheries; there is great need of new industries. The self-interest of a few individuals, acting upon the ignorance of the mass of our people, has hitherto been the means of keeping out capitalists and checking immigration. It can scarcely be possible, however, that this state of things should be of long continuance. And Newfoundland once thrown open will then take her place and be welcomed as an equal in the confederacy of the British Provinces, instead of being regarded, as she now is, as only a "few barren rocks where the fisherman may dry his nets."—*July, 1870.*

October 25th, 1870.—Since the above was written the Rev. Jno. Lockward has been in town, and told me that on account of the failure in the demand for copper and nickel, owing to the present war and other causes, the works at Tilt Cove are in a great measure suspended, and a large number of the operatives dismissed. It appears that the proprietors have not effected any sales this year

and consequently have large quantities of ores lying in their stores in England. This check cannot be considered otherwise than as a partial hindrance, which it is to be hoped will soon be removed. The surveyors also have returned without accomplishing their intended route, owing to the want of water and failure of stores. I believe they returned upon their route when half way across. It is true that we have had an exceedingly dry summer.

ART. IV.—RECORD OF OBSERVATIONS ON THE GEOLOGY OF NOVA SCOTIA, SINCE 1855. BY REV. D. HONEYMAN, D. C. L., F. G. S., &c., *Director of the Provincial Museum.*

(Read December 12, 1870.)

I PROCEEDED from Arisaig to examine the district about Antigonish, I took the road that passes along Arisaig Brook and Doctor's Brook, through the mountains. South of these mountains before descending into the lower ground I found a considerable outcrop of Lower Carboniferous Limestone, shewing the existence of the Carboniferous formation in this direction. Having reached Antigonish, I commenced the examination of the subtriangular area of rocks, of which the Sugar Loaf forms a part.

In this band there are two anticlinals and an intermediate synclinal. The south side of the one anticlinal is overlaid unconformably by carboniferous strata, and so is the north side of the other. The axis of the southern anticlinal is in the line of the summit rock of the Antigonish Sugar Loaf. This rock is greenstone. The line of the northern anticlinal is about two miles north of the Sugar Loaf. The greenstone of this axis is exposed in an outcrop on McDonald's farm near the Gulf Road, and also in McDonald's Brook to the east. This axis extends eastward and outcrops on the side of St. George's Bay. It also extends westward and outcrops in a bluff east of Saml. Cameron's. This area of metamorphic Arisaig strata is bounded S. W. and N. by carboniferous strata. In a small brook at the side of the Gulf