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tion of nickel and other valuable materials in the crude ore, a mass weighing forty-five ounces was reduced to powder, and submitted to analysis by the usual methods, with the following results:

| | | |
|---|---|---|
| Iron | 24.78 | |
| Nickel with a trace of Cobalt | 8.26 | |
| Arsenic (mean of two determinations) | 3.57 | |
| Sulphur | 22.63 | |
| Copper | 0.06 | |
| | | 59.30 |
| Silica | 28.40 | |
| Carbonate of Lime | 4.00 | |
| Magnesia | 4.40 | |
| Alumina | 3 21 | |
| | | 40.01 |
| | | 99.31 |

The cobalt equals about three parts in a thousand of the weight of the oxyd of nickel as given above, and is only detected by delicate tests. The five substances making 59.30 per cent of the ore are separated as corresponding to the metallic portion of the mass, although it is probable a portion of the iron is derived from the gangue.

In the process of dressing the ore, the earthy parts being removed by washing, the composition of the ore in 100 parts as deduced by calculation from the above, would be

| | |
|---|---|
| Iron | 41.79 |
| Nickel } Cobalt } | 13.93 |
| Arsenic | 6.02 |
| Sulphur | 38.16 |
| Copper | .10 |
| | 100.00 |

The small proportion of arsenic shews that a great portion of the metals must exist as simple sulphurets, and that, contrary to what might have been supposed at first sight, a large part of the grayish ore must be white iron pyrites.

A mass of the copper ore from the same mine weighing nine and a half pounds, was submitted to assay. The metal existed in the form of copper pyrites, and the yield of the specimen was 11.6 per cent of metallic copper.

The specimens of ores from this locality are very liable to decomposition by exposure to the atmosphere, and the result of this process upon the nickel ore, is a salt which has not to my knowledge ever before been described as a natural product. It coasts the surfaces with a delicate white or greenish-white efflorescence, which in some cases is seen to be composed of extremely delicate acicular crystals several lines in length, and apparently rhombic in form; the taste is metallic-astringent. By a gentle heat the salt loses water, and the residue, which is perfectly soluble, gives the reactions of sulphuric acid and nickel. No other metal is present, and hence the crystals are a hydrous sulphate of nickel, which is appropriately designated mineralogically as *nickel vitrol*.

The decomposition of cobaltiferous ores often gives rise to a product of very great value, the earthy cobalt, which is an oxyd of the metal mixed with variable portions of iron, manganese, &c. Very valuable deposits of this have recently been found in Missouri which are already a source of great profit; they are derived from sulphuret and arseniuret of cobalt, which, associated with nickel, copper and lead, abound in the vicinity. The detection of a small portion of cobalt in association with these metals upon the shores of Lake Huron, should lead us to look for deposits of this rare and valuable material.

In the same band of rocks farther west, metalliferous veins occur, presenting copper with manganese, and it is not improbable that with these associations we may detect the presence of nickel and cobalt. In the veins on the coast, near the mouth of Spanish River, rutile occurs in delicate acicular crystals.

The Wallace Mine is the second place in which cobalt has been detected in Canada. I have already noticed it in the form of arseniate of cobalt, forming reddish crusts upon calcareous spar, at Prince's Location on Lake Superior. In this locality it is associated with vitreous copper, green and blue malachite, and native silver, while other parts of the same vein yield native silver, vitreous silver, blende and copper pyrites; in this connexion it may be mentioned that a mass of the silver ore, selected by myself from some hundreds of pounds, as an average sample, gave on assay 3.6014 per cent of silver, equal to 72 lbs. to the ton of ore. A portion of the silver, extracted by a furnace assay from this ore, was found on examination to contain a small portion of gold, amounting to about one part in 7000 of the silver.

*Eastern Townships.*

The results of such of my mineralogical examinations in the Townships of the East as have not been embodied in your own Report, will be the subject of future description when I shall have been enabled to submit them to a careful consideration. Many substances, rare and of great scientific interest, have been detected; I shall at present give only the names and localities of some of them. In the trap of Montreal, yellow sphene, cancrinite, with heulandite and analcine; in the trap of the Mountains of Brome, Yamaska and Ste. Thérèse, the same sphene has been detected, and in the first associated with fine blue cancrinite, reddish elaeolite and crystals of a white nepheline or sodalite. The magnetic iron ore beds of Sutton, and Brome, have furnished veins of a rare variety of sphene, which is white, often tinged green from the presence of copper. Rutile in small brilliant crystals, was found associated with crystallized specular iron in Sutton, and the latter species, which is found in many other localities, is finely crystallized in quartz in St. Armand, and in tabular crystals an inch and more in diameter, in Inverness. The clay and talcose slates of Brome contain in abundance the rare mineral ottrellite or phyllite, while the soapstone and serpentine rocks have in a great number of places afforded pierolite, talc, amianthus, a species which appears to be kammerite or rhodochrome, schiller spar, diallage in vast quantity, and chromic and magnetic iron. In Bolton and Sutton, a massive crystalline carbonate of magnesia is found in beds, in the latter locality associated with talc, colored of an emerald green by oxyd of chromium. The carbonate contains a small portion of carbonate of iron, and from its composition seems referable to the species Breunerite. Carbonate of lime, in the unusual form of arragonite, forms stalactites and delicate fibrous masses in a calcareous rock in Tring. The serpentine on the Rivière Bras, contains many veins of pure white heavy spar; the rutile and titaniferous iron ore of this region have already been mentioned. The dolomitic limestone and talcose rocks are very often stained with chrome green. In the nineteenth lot of the eleventh range of Brompton, nickel ochre, a product due to a decomposition analogous with that giving origin to the nickel vitriol, was detected, forming incrustations upon limestone, a fact which suggests the probability of finding cobalt (these two metals being almost invariably associated,) in connection with the adjacent deposits of manganese, which are there quite common.

I have the honor to be, Sir,
Your most obedient servant,

T. S. HUNT,
*Chemist and Mineralogist to the Geological Survey.*

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