

Appendix
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there is a great body of greenstone over it to the south, with a thick band of syenitic conglomerate associated with quartz rock interposed between them, and a range of quartz hills above. On the Thessalon Lakes, great mountain masses of quartz rock, with subordinate jasper conglomerates, appear to underlie the limestone, and at LaCloche, a band of 3,000 to 4,000 feet rests upon it.

Independent of the overflows, igneous rocks are connected with the formation as intrusive masses, in numerous parts of the area occupied by it. These intrusive rocks consist of greenstone and granite. The intrusive greenstones do not seem to differ much in mineral character from those composing the overflows. They constitute dykes which run in so many directions, that it is difficult to determine the prevailing ones. These dykes vary in breadth, from a few inches to several hundred feet. They cut all the interstratified rocks of the formation, igneous as well as sedimentary, and splitting into branches, which often join one another and enclose great fragments and masses of strata, constitute an intricate labyrinth. The intrusive granite, in so far as it has come under my observation, is in general of a decided red colour, arising from the presence of a largely preponderating quantity of red feldspar, which is mingled with translucent white quartz; mica is not very abundant, and hornblende sometimes accompanies or replaces it. From large masses of the rock, both these minerals are frequently wholly absent, but epidote in general forms a constituent, sometimes in great abundance, whether with or without mica and hornblende. The intrusive granite appears to occupy some considerable areas, fracturing, tilting, thrusting aside, and metamorphosing the strata around them, and cutting them by a complexity of dykes which emanate from the nuclei, and reach to considerable distances. The quartz rock in its immediate vicinity becomes more perfectly vitreous, and sometimes assumes the red colour of the granite; thinly interstratified quartz and slate become gneiss; and numerous fragments of the strata caught and enclosed by the granite, and thus changed, are penetrated with epidote, and exhibit as much of it as the granite itself. The different intrusive rocks, as related to one another, display a succession of events in the history of the formation. There are, of course, a set of dykes—greenstone no doubt—cutting the sedimentary rocks, and giving issue to the greenstone overflows: it is difficult, however, to identify these. But another set of greenstone dykes are seen cutting both the sedimentary and igneous strata; intrusive granite thrusts all these antecedents aside, dykes as well as strata, sending forth dykes of its own order, intersecting all; and then another set of greenstone dykes cuts through the intrusive granite, its dykes, and all that previous causes had placed. Evidences of disturbances and dislocations accompany all these successive intrusions, those connected with the granite being the most violent. But there is in addition, another set of disturbances of still posterior date, and it is to these that are due the presence of those metalliferous veins which give the country its value as a mineral region.

The metalliferous veins intersect all the rocks that have been mentioned. They are probably themselves intersected by cross courses, breaking their regular continuity; but that slips or displacements of the country on opposite sides of the veins have occurred, when the fissures were formed that constitute their mould or receptacle, is not left in doubt. Numerous instances were observed, where both granite and greenstone dykes, cut by the metalliferous veins, were suddenly heaved considerably out of their course. This fact may by some be deemed valuable,

as shewing the probable great depth and distance to which the veins may run. The metal which these veins hold in the greatest quantity is copper, and the ores in which it occurs are vitreous copper, variegated copper and copper pyrites. Iron pyrites is sometimes associated with them, but in general not in large quantity. Copper pyrites in one instance was accompanied by rutile, and in another by the arsenuretted sulphuret of iron and nickel containing a trace of cobalt. The gangue or vein stone in which the copper ores are contained is in general white quartz, and there is very often present, but not in very great quantity, white compact dolomite, which in druses assumes the forms of pearl spar, and brown or bitter spar; calc-spar also appears occasionally in druses in dog-tooth crystals.

The veins vary in breadth from a few inches to sometimes thirty feet, but when of this last great breadth, or even much less, they usually contain a considerable amount of brecciated wall rock mixed up with the gangue; many of them range from one to three and four feet, and their slope or underlie varies from about 50° to 90°. From such as might be considered master lodes, innumerable branches of various sizes start, some of which visibly diminish before proceeding far, and dwindle to nothing, while others maintain moderate widths, with much regularity, for considerable distances, and may run to a junction with parallel lodes. The lodes have a bearing agreeing with the general strike of the formation, which roughly coincides with the general trend of the coast. They are thus, in a rude way, parallel to one another, and run in a direction between west and north west, more nearly approaching the latter.

The quantity of copper contained in the lodes is very various, ranging from what might result from mere specks of ore in some to the contents of large workable quantities in others. But to ascertain what an approach to an average might be would have required more time than we had at command, and more expenditure than the funds devoted to the Survey would authorize, as it would have necessitated the determination of the produce of several—a work requiring the labour of many practical hands in a totally uncleared country. Specimens of ore were taken from many lodes; but it would be a very distant approach to the probable contents of a lode that would be ascertained by means of mere hand specimens, with whatever fair intentions they might have been selected. It appeared to me a preferable plan to ascertain, with all the precision possible, the produce of the lodes which had been most uncovered and worked on the locations, being persuaded that though some of them vastly surpass in richness any that came within my observation in the interior, others will yet be found to equal them. In no part of the country visited, from the vicinity of Sault Ste. Marie to Shebawenahning, was any great area wholly destitute of cupriferous veins, and it would appear singular if a region extending over a space of between one and two thousand square miles, and so marked by indications, did not in the course of time yield many valuable results.

In regard to the productiveness of the lodes, it is to be remarked that it appears probable it will be different in the different qualities of rock they may intersect. From the described arrangement of the strata, it will be perceived that the lodes must vertically pass from one quality of rock to another; and as they keep a rudely regular course, they must do the same thing horizontally, from the effects produced in the geographical distribution of the rocks, by undulation or denudation of the strata. So far as my observation went, it appeared to me to be a fact that the copper was most abundant in the greenstone, least so in the sandstone or quartz rock, and more copious in the

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