

rights over the old original grant of twenty square miles, but only 655 acres of surface rights remain of the former 12,800, of which about 300 form part of the town of Bruce and consist of valuable town sites, docks and water rights. In addition to the 400 ton concentrating mill, there is all the plant and machinery necessary for the mine's development in full working order.

The copper ores, chiefly chalcoppyritic, which are found in such abundance, apparently are distributed in well-defined bodies or zones, but, taking into consideration the wide area over which discoveries have been made in this section of the country, and recognizing that these are only a fraction of the whole, it is impossible to deal with this subject within the limits of this paper. Suffice it to say that hardly a township exists without one or more ore bodies, and that it might fairly be stated that in the more settled parts there is hardly a farmer but has some indications of mineral wealth on his property; and it is evident that whatever treatment or process may be generally adopted in the future, it should be one that would enable the smallest as well as the largest producer to participate in, and thus aid in the gradual development of what must prove an immense addition to the mineral wealth of the country. In fact, the company is being constantly urged to erect a smelter sufficiently large to serve the general public in addition to its own requirement, and this should prove a great boon to those in the locality on whose properties are showings of copper.

GEOLOGY.

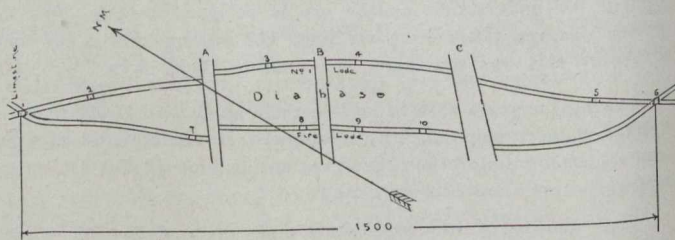
The geological sequences from Lake Huron through the Bruce Mines to the north are diabase in the lower slate conglomerate, encircled by dolomitic limestone and followed by the upper slate conglomerate, red quartzite, red jasper conglomerate, with white quartzite forming an anticline, of which the white quartzite is the apex. The lodes have an average strike of 25 degrees W of N., and dip, as a rule, almost vertically to the S.W., until the summit of the anticline is passed, when the dip, if any, is reversed, although there are ore bodies found with an E. and W. strike and dipping S.W. These occur in the upper conglomerate, and appear to be true fissures. All these rocks belong to the Huronian series.

ORE OCCURRENCE.

We have to deal with three classes of ore occurrence. First, in the quartzite, specular iron is often associated with the chalcoppyrite, and in places chalcosite is found on the surface. This, on weathering, assumes the appearance of iron, so that the prospector should be warned of the resemblance. The siliceous ores are often accompanied by veins of calcite. Secondly, the fissure veins of the upper conglomerate. Although these were known in the earliest days, they appear to have been disregarded until recently, when a most important discovery was made on this property, and a most interesting one from a mineralogical point of view, as a collection of copper ores might be made from it, both black (melanconite) and red (cuprite) oxides, the latter followed by native copper in leaflets, besides the ordinary bornite, chalcosite and chalcoppyrite, with apparently a little pyrrhotite. These can be seen *in situ*, not vertically, as might be expected, but horizontally, the native copper being to the south and followed by the other ores. The only other instance of this order of deposition known to the writer is found at the Spassky Copper Mines in Siberia, where solid chalcosite forms one wall with ore diminishing gradually in value over a width of thirty feet, where it carries only two per cent. As the gangue of these ores carries considerable lime, they would furnish suitable fluxes for the siliceous ores. The third series are the lodes formed in the diabase. A peculiar characteristic of these is that the larger deposits of quartz are found on the sides of what are to-day merely rounded knolls protruding above the ordinary ground level. In many cases glacial action has sheared the crown off, so that almost flat tables are formed, and then the numerous reticulated veinlets are very clearly seen crossing in every direction. (See Plate IV.) At times the larger ore bodies cross one another and form important

junctions, although continuing a serpentinous course with little or no alteration of their mineral contents, and yet preserving their average strike.

A typical plan of this occurrence can be seen on the Wellington



and Huron Copper Bay sections, now being worked by the Copper Mining & Smelting Company of Ontario, Limited.

- A. Aphanitic Dyke, 25 feet wide.
- B. " " 20 " "
- C. " " 40 " "
- No. 1. Palmer's Shaft, 360 feet deep.
- " 2. Bray's or No. 2 Shaft, 450 feet deep.
- " 3. Rowe's Shaft, 240 feet deep.
- " 4. Mitchell's or No. 3 Shaft, 240 feet deep.
- " 5. Scott's or No. 4 Shaft, 340 feet deep.
- " 6. Crazie's Shaft, 270 feet deep.
- " 7. Unknown. Depth about 75 feet.
- " 8. Collin's Shaft, 200 feet deep.
- " 9. Gribble's Shaft, 200 feet deep.
- " 10. Knight's Shaft, 210 feet deep.

The numerous shafts are relics of the time when hoisting was done by a horse whim.

Dolomitic limestone comes in at the N.W., and the northern portion has not been followed up. That on the south has been explored for 480 feet by an adit parallel to the limestone.

This gigantic horse, 1,500 feet in length, is crossed by three dykes, the material of which differs but slightly from the ordinary country rock. The centre one has not caused any alteration, but the other two are fracture planes, and the entire mass of ground has been forced twenty feet to the north, throwing the lodes accordingly. Whilst at the junction to the west of Palmer's shaft a very rich ore body was found, in parts twenty-four feet wide, to the east, at Crazie's, the junction did not produce anything like such high value, although the quartz is from eight to sixteen feet wide.

The principal ores are chalcoppyrite, with a little bornite, and the gangue is highly siliceous. At the surface some very fine deposits of chalcosite were mined, and bornite at the 270 foot and 360 foot levels is again coming in. A typical analysis of poor ore shows:—

Silica	91%
Iron	4.35%
Gold	.01 oz.
Silver	.80 oz.
Copper	2.21%
Lime	.70%
Sulphur	Not stated.

The average run of the mine is three and one-half per cent., whilst the known extent of the lodes is 8,000 feet longitudinally.

TREATMENT OF ORE.

After being crushed to pass a two and one-half inch ring, the ore was fed to 24 inch rolls, from which it was elevated to sizing trommels, the oversize coming back for re-crushing, the finer feeding direct into the jigs. The waste from two series of jigs was again brought back for crushing, whilst the finer stuff went into spitzkasten and fed on to six foot Frue vanners, the waste from the second series of jigs being taken to a six foot Bryan mill and a 30 inch fine crushing roll. The resultant product was lifted by bucket elevators and fed to Linkenbach double-deck tables, 16 feet in diameter. Eventually these finer slimes were put