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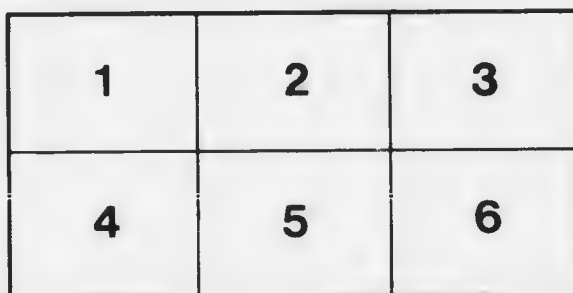
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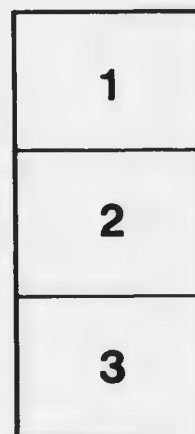
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REPORT
OF
J. W. DAWSON, LL.D., F.R.S., F.G.S.,
Principal of McGill University, Montreal,
ON THE
Deposits of Apatite on Certain Lots in the
Township of North Burgess,
ONTARIO.

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MEMORANDUM
ON
VEINS OF APATITE
IN THE
TOWNSHIP OF NORTH BURGESS, ONTARIO.

This memorandum refers to the following lots in the township above named:

- (1.) Lot 8, on Concession VII, 125 acres known as the McLaren property.
- (2.) Lot 16, Concession V, 200 acres known as the Donnelly property.
- (3.) Lots 20 and 22, Concession VI, about 200 acres.
- (4.) Lot 19, Concession VI, about 100 acres.
- (5.) Lot 15, Concession VI, 200 acres.

The whole of these lots are situated on a belt of Laurentian rocks which traverses the township of North Burgess and adjoining townships, and which has been designated by the officers of the Geological Survey as the Apatite-bearing belt of the region. It is remarkable for the abundance of this mineral, which, in some places, is already profitably extracted.

The deposits observed in a visit to the properties above designated, were as follows: (I shall, in naming them, use the word "*vein*," though some of them run so regularly with the strata as to merit the designation of beds):

- (1.) *Lot 8, Concession VII, or McLaren Property*—Near the northern end of this Lot some small excavations have

exposed two veins of Apatite. They are contained in beds of gneiss and pyroxenic rock, with which they run conformably, and are cut by dykes of a black hornblendic rock. The beds of gneiss and the contained veins dip to the south-east at an angle of about 80° , and their strike is N. 30° E. They are about 27 paces apart, and are exposed in a small knoll or rising ground, about 30 feet above the neighboring depressions. The first, or western vein, is 3 to 4 feet thick, and consists of gneissose rock with crystals of mica, holding large imbedded masses and crystals of Apatite, amounting to about a third of the whole. The second vein is similar, but attains in some places a thickness of six feet, though apparently not richer in Apatite than the first. There were on the ground about 10 to 12 tons of green and reddish crystalline Apatite of great purity, which had been extracted from two small excavations in these veins.

As these veins run with the bedding, they may be expected to extend diagonally across the lot for about one-third of a mile, and toward the south-west they will rise into higher ground, more favourable for the extraction of the mineral. On the south end of the lot other veins, supposed to be workable, are stated to have occurred; and on an adjoining lot the gneissose beds, those of a very micaceous quality, are traversed by numerous and valuable veins, running transversely to the bedding, and which should extend into the area now under consideration, somewhat to the southward of the existing exposures, where I would anticipate in consequence a much greater development of the mineral than at the places where it has been opened, which have probably attracted attention from the accidental prominence of the surface, caused by the hornblendic dykes already mentioned.

Lot 16, Concession V, or Donnelly Lot.—On this Lot the rock of the country is different from that in the last mentioned. It consists in great part of beds of white crystalline limestone, traversed by low ridges of gneiss, the general strike being N. 30° E., though with occasional flexures. On one of the lower gneiss ridges a large and very remarkable

deposit of Apatite has been discovered, and is exposed in trenches opened along the outcrop. It conforms to the bedding of the containing rocks, which, however, in one part of its course are much contorted.

At the south-western end of the excavation is seen a vein of crystalline flesh-coloured Calcite, holding crystals of Mica and of pure green Apatite. Its altitude is nearly vertical and its thickness 8 feet. In a large part of this thickness the Apatite is equal to about one-half of the mass, and amounts probably to about one-third of the whole. At about 16 yards to the north-eastward the above vein is seen to be abruptly cut off, apparently by a fault, and beyond this there appears on the same line of strike, four parallel veins of Apatite traversing a hornblendic gneiss and occupying a breadth of about 8 feet. Their aggregate thickness amounts to about $3\frac{1}{2}$ feet of pure crystalline Apatite. Beyond this place for about 80 paces the vein has been exposed at intervals and shows portions with calcareous vein-stone holding Apatite, and other portions containing Apatite alone. In some places it has been much affected by the contortions and faults of the enclosing beds, but preserves its richness; and finally, about 100 paces from the place of beginning it bends suddenly to the north-west, its strike being N. 30° W., and at the same time increases in volume, attaining, at the spot where it has been last observed, a thickness of 11 feet of nearly pure Apatite. At this place the ground descends and the vein has not been traced farther; but there are indications that it returns to its original strike, and extends to the north-eastward, while to the south-east there are also indications of its extension to some distance, but no openings have been made to test its quality.

About 60 tons of very pure green Apatite have been taken out of the openings made to prove this vein. This does not include the crystals imbedded in the calcareous vein-stone, a large proportion of which might be dressed to a high percentage by hand picking. The whole could, how-

ever, be easily obtained by calcining the mass and washing away the lime and scales of Mica, leaving the crystals of Apatite. Mr. Brown, a gentleman employed in exploring this property, has successfully tried this process on a small scale, and the product was found to be an almost pure Apatite.

On the same lot, about half a mile to the north-west, there is a second vein of Crystalline Calcite, with crystals of Apatite, which is probably workable. It occurs at the junction of limestone and gneiss, and is traceable on the surface about 100 yards, but has not yet been opened. A third exposure, apparently of small veins of Apatite, occurs at some distance to the southward.

(3.) *Lots 20, 22, 19, Concession 171.*—It will be observed that though the whole of these deposits are in the Laurentian, those of the Donnelly property belong to a different band of these beds, of more calcareous quality than that on the McLaren property. In the lots above mentioned we return to the more gneissose country, continuous with that of the McLaren lot. The principal exposures observed are in lots 20, 19 and 15. On lot 20 a shaft has been sunk on rising ground near one of the bays of Salmon Lake. It was full of water when visited, but the bed exposed was stated to be from 2 to 3 feet thick, and of remarkably pure quality. About 105 tons of the mineral had been taken from this shaft and shipped. On another part of the property I saw a vein containing from 1 foot to 18 inches of pure Apatite traversing hornblendic gneiss. It is in a nearly vertical position, and with strike E. 15° N. In the vicinity of this there appeared to be other veins, and the whole traversed rising ground, very favourable for mining.

At some little distance from this place in lot 19, the ground in continuation of these veins has been opened up by surface excavations and shows three or four remarkable veins. One of these, containing from a foot to 18 inches of more nearly pure Apatite, had been exposed along its outcrop for than 100 yards, and seemed very regular and continuous.

On lot 15 a small excavation had exposed a vein of pure Apatite apparently 3 feet in width and traceable on the surface for some distance, conformably to the strike of the beds which here run about N.E. These lots I regard as of great value from the number of veins which they show, the great purity of the Apatite and the favourable conditions for easy running and drainage.

I would make the following general remarks on these properties :

The deposits in all of the above lots are valuable, and probably have been too little opened as yet to disclose their full extent and value. They would all yield by hand picking a pure crystalline phosphate of at least 80 per cent., besides considerable quantities of less rich material to be worked up by calcination or by crushing and washing.

On any of the above properties mining operations might be carried on at once, and would be profitable from the first; but before fixing the permanent site of works it would be desirable to trace more fully the extension of the deposits, so as to ascertain the most productive and favourable localities.

It is to be remarked here that the greater number of the veins observed occur in a very hornblendic and micaceous gneiss often associated with bands and veins of pyroxenic rocks and also in the vicinity of the thick beds of crystalline limestone. These rocks afford means of tracing the deposit. Further the existing exposures are usually on slight elevations or rising grounds preserved from denudation by the harder beds of gneiss, and little exploration has been made of the valleys, in which it is not improbable that the veins and beds of Apatite may be discovered in a still larger scale.

Apatite of 1st class per centage is at present extracted from these veins at a cost of about \$6.00 per ton. I have little doubt that by working on a larger scale and with the best appliances the cost of extraction might be diminished. It is probable that in some localities several veins of the

mineral might be worked together, so as further to reduce the cost of extraction. The Donnelly lot is distant only $1\frac{1}{2}$ mile from the Rideau canal, none of the properties is more than from 5 to 10 miles distant from the railway at Perth.

It would be premature to attempt to calculate the quantity of Apatite on these properties, but the exposures already made show that very large supplies for many years could be obtained, and new observations may be expected, to increase their productiveness. The mineral obtained would be of remarkable purity, and the greater part of it might be relied on as containing from 75 to 90 per cent. of phosphate of lime.

I may add that the district affords abundance of wood for fuel and other uses, and also water-power. It is further my decided conviction that the richness of this remarkable belt of country in the Phosphate of Calcium is as yet very imperfectly known, and will for many years reward the diligence of explorers with new discoveries. This anticipation I am confident applies to the properties now under consideration, which, in so far as I can judge from the published reports, are not inferior to any of those which have attracted attention in the region.

J. W. DAWSON.

LL.D., F.R.S.

MCGILL COLLEGE, May 23, 1872.

*Extract from Report of the Geological Survey of Canada,
1870-71, page 319.*

A. R. C. SELWYN, Esq., F.G.S., DIRECTOR.

PHOSPHATE OF LIME IN NORTH BURGESS.

"On Donnelly's lot, number 16, in the 5th range of North Burgess, are several openings. Pit No. 1 is 150 yards north-east of the house, and affords large crystals of Apatite with mica, in strings in a pink carbonate of lime, with pyroxene. Pit No. 2, 50 yards further, shows Apatite in carbonate of lime; and 15 yards from the last, at pit No. 3, is a vein of Apatite running N.N.W., and dipping eastward at $< 75^{\circ}$ - 80° . Its width is from 4 to 6 feet, and it has yielded about 40 tons of Apatite. This vein occurs in gneiss, near which is a coarse-grained crystalline limestone. Forty yards to the north-west of the last is a fourth pit. Here is an irregular vein, showing the same strike as before, cutting a quartzose gneiss, and having in one place a breadth of 9 feet of nearly pure Apatite. In another part of the excavation it was $3\frac{1}{2}$ feet in breadth, and separated by 3 feet of gneiss from a smaller vein of 6 inches on the south-west side. About 15 tons Apatite have been raised from this opening.

"On Lot 20, in the 6th range, is a vertical vein of Apatite, associated with mica and quartz, and varying in breadth from $1\frac{1}{2}$ to 4 feet. Its strike is W.N.W., in a close-grained hornblendic gneiss, dipping S.E. $< 65^{\circ}$. It has been mined to a depth of 40 feet by means of two shafts, and nearly 200 tons of Apatite extracted, all "firsts."* Of this, 110 tons were shipped by the Rideau canal, and 85 tons sent to Perth. Some of this was sold in Liverpool for £4.10.0 sterling per ton in 1867."

* Firsts, 75-90 p. c. tribasic phosphate.

