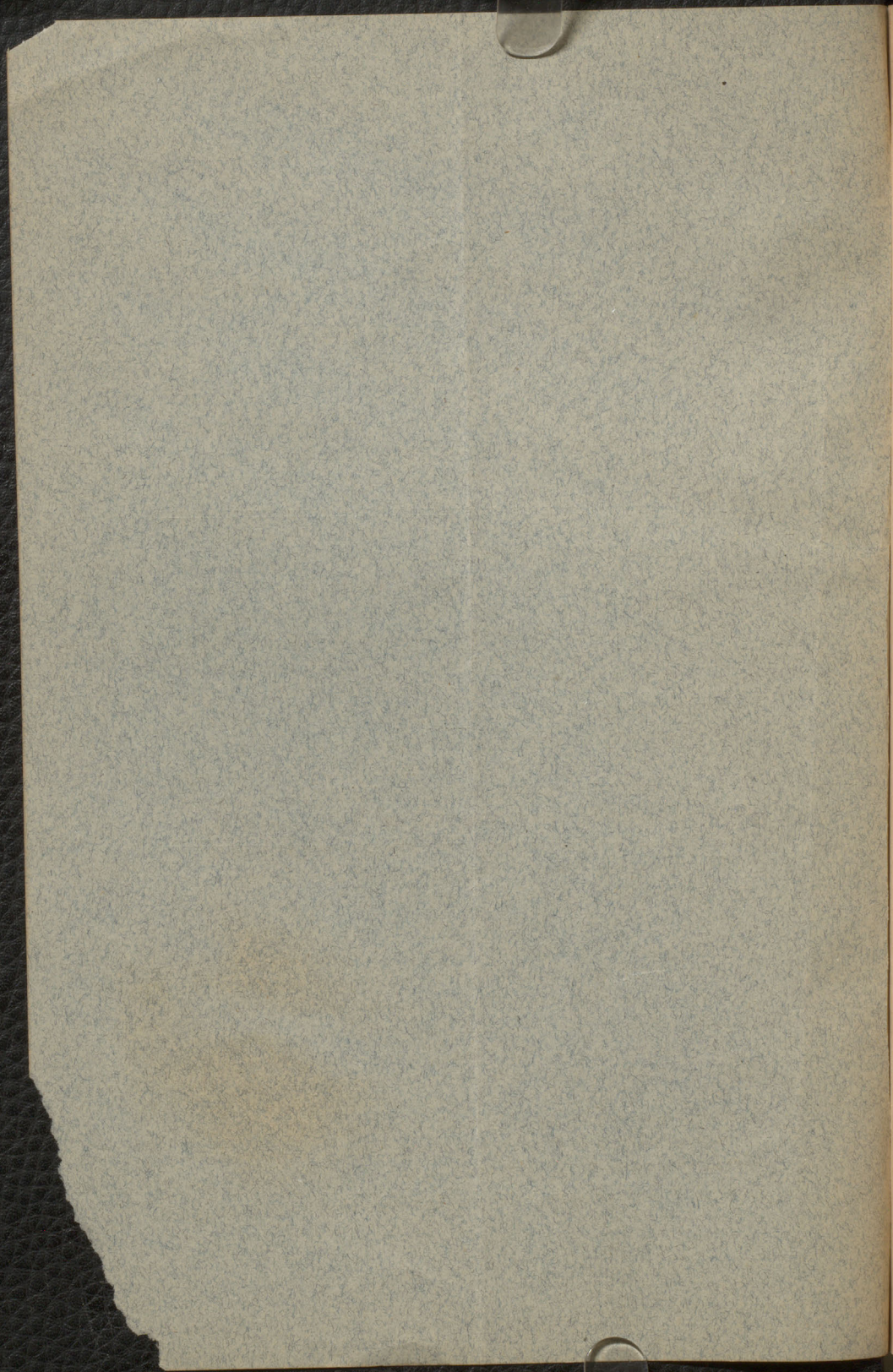

NOTE
ON
THE COMPOSITION OF DAWSONITE.

By B. J. HARRINGTON, B.A., Ph.D.



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In connection with the discoveries of Dawsonite which have been made at Pian Castagnaio in Tuscany,* a few remarks on the composition of this curious mineral may be deemed of interest. It will be remembered that the specimens originally described in 1874 were from joints in a white feldspathic dyke cutting the Trenton limestone near McGill College.† Since 1874 small quantities of the mineral have been observed in the joints of several other dykes in the same neighbourhood, and beautiful specimens have been obtained at the Montreal reservoir, in what is probably a continuation of the dyke near the college. In the latter instance the Dawsonite is associated with calcite, dolomite, pyrite, minute quantities of galena and occasionally of a black substance rich in manganese. In all cases the mineral occurs in more or less fibrous blades, which are often arranged in a radiated manner. It reminds one of tremolite, and in the collection of minerals acquired by McGill College from the late Dr. Holmes of Montreal, there are several specimens of it which he had so marked.

The first specimens of Dawsonite analysed were found to contain between five and six per cent. of lime, and there was no evidence to prove that this was not one of the proper constituents of the mineral. Subsequently, however, it was found that the proportion of lime differed widely in different cases, while the ratio between the other constituents was constant. From this it

* Two papers on the subject have appeared within the last few months in the Bulletin of the Mineralogical Society of France (IV., 28 and 155), the first, entitled "Sur un nouveau gisement de Dawsonite (hydrocarbonate d'aluminium et de sodium) et sur la formule de ce minéral," by C. Friedel; the second, "Sur le gisement de la Dawsonite de Toscane," by Maurice Chaper.

† *Can. Nat.* II. VII. 305. "Notes on Dawsonite, a new Carbonate."

was inferred that the lime really belonged to intermixed calcite which could not be completely separated. This view is fully confirmed by Friedel's examination of the Dawsonite discovered by M. Maurice Chaper in Tuscany, and the right of the mineral to rank as a good species may now be considered as fully established. Its special interest of course depends upon the fact that it is the only well defined carbonate containing aluminium which has yet been met with in nature.

The Tuscany Dawsonite is stated to occur in minute crevices, both in marl and sandstone, the latter being impregnated with dolomite. Among the minerals associated with it are calcite, dolomite, pyrite, fluorite and cinnabar; and it is said that the miners of the region look upon Dawsonite as a favourable indication in their search for cinnabar. The Tuscany mineral is evidently obtained in a purer condition than ours, and from his analyses Friedel concludes that the composition of the species is represented by Al_2O_3 , Na_2O , 2CO_2 , $2\text{H}_2\text{O}$, or, as he also puts it, $\text{Al}_2(\text{CO}_2\text{Na})_2(\text{OH})_4$.

The following table gives under I, the results of Friedel's analyses; under II and III the original analyses of the mineral from McGill College; and under IV a recent one of that found at the Montreal reservoir. The last, it will be seen, indicates the presence of a large proportion of calcite:—

| | I | II | III | IV |
|-------------------------|-------|--------|---------|-------|
| Carbon dioxide..... | 29.59 | 29.88 | 30.72 | 32.23 |
| Alumina..... | 35.89 | 32.84 | 32.68 | 24.71 |
| Soda..... | 19.13 | 20.20 | 20.17 | 15.64 |
| Water..... | 12.00 | 11.91 | (10.33) | 9.06 |
| Lime..... | 0.42 | 5.95 | 5.65 | 16.85 |
| Magnesia..... | 1.39 | tr. | 0.45 | tr. |
| Potash..... | | 0.38 | | |
| Manganese dioxide... .. | | | | 0.23 |
| Silica..... | | 0.40 | | 0.84 |
| | 98.42 | 101.56 | 100.00 | 99.56 |

If from the above analyses we deduct the substances which may justly be regarded as impurities, including lime and magnesia in the form of carbonates, and then calculate the normal constituents for one hundred parts, it will be seen that the results agree well with the formula $\text{Na}_2[\text{Al}_2]\text{C}_2\text{O}_8 + 2\text{H}_2\text{O}$:

| | I | II | III | IV | FORMULA. |
|---------------------------|-------|-------|-------|-------|----------|
| Carbon dioxide* | 29.27 | 27.96 | 29.06 | 27.78 | 30.49 |
| Alumina | 37.88 | 36.42 | 36.70 | 36.12 | 35.55 |
| Soda | 20.19 | 22.41 | 22.65 | 22.86 | 21.48 |
| Water | 12.66 | 13.21 | 11.59 | 13.24 | 12.47 |

It has also been suggested that the formula may be written $3(\text{Na}_2\text{CO}_3) + (\text{Al}_2\text{C}_3\text{O}_9) + 2(\text{H}_6[\text{Al}_2]\text{O}_6)$.†

According to Friedel, the Tuscany Dawsonite when heated to 180°C . loses nothing but a little hygrometric water. Like the Canadian mineral it gives up both its "carbonic acid" and water at a red heat. The calcined residue also dissolves easily in hydrochloric acid. Neither the hardness nor the specific gravity of the European variety has been ascertained. For the Canadian mineral the original determinations were, $\text{H} = 3$, $\text{G} = 2.40$.

* The atomic ratios for I and II are as follows :

| | | | |
|---|-------|-------|---|
| C | .665 | .636 | 2 |
| $[\text{Al}_2]$ | .369 | .355 | 1 |
| Na | .651 | .723 | 2 |
| O | 2.764 | 2.696 | 8 |
| $\left. \begin{array}{l} \text{H}_2 \\ \text{O} \end{array} \right\}$ | .703 | .734 | 2 |

† Am. Jour. Sci. III. xxii. 157.

