

III.—*On Bowlingite, a new Scottish Mineral.*

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IN a recently exposed part of a quarry at Bowling, on the Clyde, my friend Mr. John Young, F.G.S., noticed a vein from an inch and half to half an inch in thickness, of a deep green mineral having the hardness and peculiar feeling of stealite, and having secured a good sample he forwarded it to me for analysis. It occurs filling a clean sided fissure on the north side of the quarry. The rock is described by Mr. Samuel Allport, F.G.S.,\* as follows:—“At Bowling, on the North bank of the Clyde, three miles east of Dumbarton, the rock forming the “Hill of Dun,” is a coarse crystalline dolerite, varying in colour from brownish black to black, with distinct crystals of augite, olivine, and felspar disseminated through it. This porphyritic structure is well seen in thin sections. The base is rather finely crystalline and consists of small crystals or grains of the above mentioned constituents, together with numerous grains of magnetite. The large crystals of plagioclase are clear and beautifully striated, they frequently contain glass cavities, and here and there portions of the base have been enclosed in them . . . This rock affords excellent examples of serpentinous pseudomorphs after olivine in various stages of formation; the crystalline forms are unusually perfect, and the gradual encroachment of the serpentinous matter on the clear olivine may be very well seen. In one of the sections—microscopic—an old fracture has been filled with serpentine, thus forming a vein which traverses some of the large felspar crystals and the surrounding base. A few cavities are also filled with the same substance.” I would add that the greenstone of this quarry is a basaltic dolerite of a very dark grey colour, the columns being well defined and in some places assuming a prismatic structure, but lying at various angles to the horizon. A section of the new mineral (prepared by Mr. Young) of about 1-16th of an inch in thickness, shows that the mineral is semi-

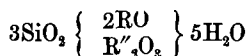
\* “On the microscopic structure and composition of British Carboniferous Dolerites.” *Trans. Geological Society*, Vol. XXX, p. 558.

transparent, and of a fine deep green colour by transmitted light. In some parts of the new mineral are to be distinguished crystals of olivine which points to the likelihood of its being produced by the hydrous decomposition of the latter. On looking over a number of specimens collected by Mr. Young for many years back, resembling the above in appearance, I found three, one from Dumbuch Rock, near Bowling, the other from Loch Fad road, Bute, and the third from the Cuthbin hills, near Glasgow. The two first turned out to be carboniferous dolerites, but that from the Cuthbins, although strongly fibrous and crystalline, was found to be the same as the Bowling mineral. A fragment magnified about 40 times is shown in fig. 8, plate VI. It is a very soft mineral having a steatitic feeling and easily ground by the teeth without the slightest gritty feeling. Both specimens have a dark green colour when in mass, and a light arsenic-green colour when pulverised. Owing to its steatitic character, it cakes when ground and has a micaceous lustre, which slightly masks its colour and gives it a grayish tint. Its sp. gr. is low, varying from 2.282 (Cuthbin) to 2.290 (Bowling). It is easily decomposed by boiling dilute acids, especially hydrochloric and sulphuric, all the bases going into solution, and the silica being left in a state only to be described as between gelatinous and slimy. As the mineral contains much water it yields that substance on being heated in a tube. The small crystals viewed under the microscope have a yellowish green colour and are quite transparent, a property not to be expected by the appearance of the mineral when seen in mass. The small proportion of carbonate of lime the mineral contains seems to be essential to it, as even the purest specimens contained about as much as the most troubled parts. The following analyses show the composition of various samples.

	Bowling.		Cuthbin.		Average.
	I	II	I	II	
SiO <sub>2</sub> .. ..	34.32	35.08	35.66	35.82	35.22
Al <sub>2</sub> O <sub>3</sub> .. ..	18.07	16.85	15.09	16.14	16.54
Fe <sub>2</sub> O <sub>3</sub> .. ..	3.65	3.92	5.22	4.85	4.41
FeO .. ..	6.81	6.95	7.02	6.99	6.94
MgO .. ..	9.57	10.22	12.41	11.73	10.98
CaCO <sub>3</sub> .. ..	5.14	4.89	5.02	4.87	4.98
H <sub>2</sub> O .. ..	22.70	21.85	19.89	19.63	21.01
	<u>100.26</u>	<u>99.76</u>	<u>100.31</u>	<u>100.03</u>	<u>100.08</u>

Both Alkalies and Fluorine were carefully tested for but neither were found. The average of all these analyses gives the following composition.

These numbers agree pretty well with an empirical formula.



but this formula does not include the calcium carbonate, so that the nature of the mineral is likely much more complex. The general formula which best expresses its composition is



I do not intend however, to discuss its constitution until I have had an opportunity of examining a larger number of specimens, and thus be sure that the analysis really represents a pure compound. As this Mineral was found at Bowling, Mr. Young proposed to call it Bowlingite, and as this is a characteristic name I give it as the name adopted.

I find an account of the Cathcart specimen, by Mr. J. Wallace Young,\* in which he gives the following analysis.

Dried at 100°	
Silicic Acid . . . . .	31·95
Alumina . . . . .	15·40
Ferrous Oxide . . . . .	21·40
Magnesia . . . . .	20·95
Water (by difference) . . . . .	6·30
Carbonate of lime . . . . .	4·30
	100·00

Mr. John Young informs me, that that analysis was done with the same sample of the mineral as I examined, so that there can be no doubt of the genuineness of the substance; so I am quite at a loss to understand how Mr. Young found the above constituents in the above proportions. He finds no Ferric oxide, yet even when the mineral is dissolved in an atmosphere of carbonic acid gas, I find over 4 per Cent. and this cannot be due to oxidation of the mineral since collected, because I took care to take a portion from the interior of the mass for examination. Then the amount of

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\* *Trans. Geological Society, Glasgow, Vol. II, p. 212.*

Ferrous Oxide he finds is nearly double the total iron I find in the mineral. Then again in the mineral dried at 100°, he finds only 6.30 per cent. of water, whereas I heated it to 105° till it suffered no further loss of weight; there was still 10 per cent. of moisture in it. The mineral was found by Mr. John Young, 16 years ago, was analyzed by Mr. J. W. Young, 11 years ago, and has been in the same drawer ever since, so I cannot believe any change has come over it since the first analysis was done. Mr. Young and I are, however, going into a complete examination of this mineral and its associates, so we expect soon to be able to set all question as to its constitution and mode of formation at rest.