Notes on mineralogy. No. VIII. On the felspar and mica of the granite of Canton / by Samuel Haughton.

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NOTES ON MINERALOGY.—No. VIII.

ON THE

FELSPAR AND MICA

OF THE

GRANITE OF CANTON.

BY

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THE granite of the neighbourhood of Canton is composed of grey quartz, a light flesh-coloured or creamy-white felspar, in large crystals, and a black glossy mica (crystals $\frac{3}{4}$ by $\frac{1}{2}$ inch) imbedded in the felspar and accompanied by quartz.

The following analyses will show the chemical character of these minerals:—

Felspar of Canton Granite.

	Per cent.	Atoms.	
Silica	64·48	1·433	
Alumina	19·12	0·367	0·374
Peroxide of iron . .	0·56	0·007	
Lime	0·45	0·016	0·386
Magnesia	trace		
Potash	12·52	0·266	
Soda	3·24	0·104	
Loss by ignition . .	0·16		
	100·53		

From the preceding analysis may be deduced the following relation among the atoms of silica, peroxides, and protoxides:—

Silica	1433	4·00
Peroxides	374	1·04
Protoxides	386	1·08

From which it is plain that this felspar is orthoclase.

The analysis of the black mica is as follows:—

Black Mica of Canton Granite.

	Per cent.		
Silica	35·50	...	0·789
Alumina	20·80	0·400	0·646
Peroxide of iron . .	19·70	0·246	
Lime	0·56	0·020	0·699
Magnesia	4·46	0·223	
Protoxide of iron . .	7·74	0·215	
Protoxide of manganese	1·70	0·047	
Potash	9·00	0·191	
Soda	0·10	0·003	
Loss by ignition . .	0·25		
	99·81		

From the preceding we obtain, in atoms,—

	Atoms.	Oxygen ratio.	
Silica	789	789	
Peroxides	646	646	879
Protoxides	699	233	

from which may be deduced the following:—

$$\left\{26(3\,RO)+74\,R^2\,O^3\right\}+90\,SiO^3,$$

or

$$\left\{\frac{1}{4}(3\,RO)+\frac{3}{4}\,R^2\,O^3\right\}SiO^{3\frac{9}{10}}.$$

These formulæ represent the analysis, and are sufficiently near to the formulæ for the Lepidomelane of Soltmann, and of the black uniaxal micas of Donegal and Leinster, to render it probable that they all are varieties of the same mineral. To show their analogy and difference, the following comparison may be useful:—

	Atoms of			
	Silica.	Peroxide.	Protoxide.	Water.
Lepidomelane	831	569	551	66
Black mica of Ballyellin*.	790	624	538	477
Black mica of Ballygihen*	804	647	515	433
Black mica of Canton . .	789	646	699	139

* Quart. Journ. Geol. Soc. London, vol. xv. p. 129.

The mineralogical formulæ of the four minerals are :—

I. *Lepidomelane* :

$$\left[\frac{25}{100}(3\mathrm{RO}) + \frac{75}{100}(\mathrm{R^2O^3})\right]\mathrm{SiO^3}^{\frac{11}{10}}.$$

II. *Black Mica of Carlow* :

$$\left[\frac{23}{100}(3\mathrm{RO}) + \frac{77}{100}(\mathrm{R^2O^3})\right]\mathrm{SiO^3}^{\frac{10}{10}}.$$

III. *Black Mica of Donegal* :

$$\left[\frac{21}{100}(3\mathrm{RO}) + \frac{79}{100}(\mathrm{R^2O^3})\right]\mathrm{SiO^3}^{\frac{10}{10}}.$$

IV. *Black Mica of Canton* :

$$\left[\frac{26}{100}(3\mathrm{RO}) + \frac{74}{100}(\mathrm{R^2O^3})\right]\mathrm{SiO^3}^{\frac{9}{10}}.$$

It appears to me that the preceding formulæ, representing black micas from Russia, Ireland, and China, balance around a mean or average formula, which may be regarded as the type species of this mineral ; viz.—

$$\left[\frac{25}{100}(3\mathrm{RO}) + \frac{75}{100}(\mathrm{R^2O^3}\right]\mathrm{SiO^3}.$$

This abstract or theoretical black mica probably exists only as an idea or conception in our minds, and may not have a concrete development in any place ; but it must be regarded as an essential constituent of the original granite formed in the astronomical epoch by the cooling of our globe. All our researches tend to prove that there is an original or type-granite, characteristic of the azoic epoch of the earth's history, marked mineralogically by the presence of four important minerals,—

1. Quartz ;
2. Orthoclase felspar ;
3. Black mica ;
4. White mica ;

and marked chemically by the abundance of potash and the absence of lime.

Trinity College, Dublin,
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