

**Notes on mineralogy. No. VII. On some rocks and minerals from central India : including two new species, hislopite and hunterite / by Samuel Haughton.**

**Contributors**

Haughton, Samuel.  
Royal College of Surgeons of England

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183 Euston Road  
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NOTES ON MINERALOGY.—No. VII.

ON SOME

ROCKS AND MINERALS FROM CENTRAL

INDIA,

INCLUDING TWO NEW SPECIES,

HISLOPITE AND HUNTERITE.

BY

THE REV. SAMUEL HAUGHTON, M.A., F.R.S.,  
FELLOW OF TRINITY COLLEGE, AND PROFESSOR OF GEOLOGY IN THE  
UNIVERSITY OF DUBLIN\*.

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*Mineralogical description of a series of Rocks collected near Nágpur, Central India, by the Rev. Messrs. Hislop and Hunter.*

THE following description of some specimens of rocks of Central India, brought home by Messrs. Hislop and Hunter, and given to me by Mr. Rupert Jones, of the Geological Society of London, may prove of some interest, particularly with reference to the metamorphic action of water at a high temperature, to which the attention of English geologists has been recently called by the valuable paper lately read by Mr. Sorby before the Geological Society of London.

- No. 1. Radiated concretionary nodule of brown carbonate of lime and iron; contains no magnesia. Locality: Girad.
- No. 2. Dark green calcareo-micaceo-hornblendic rock; metamorphic. Locality: Jambul Ghat, South of Nágpur.
- No. 3. Coarsely crystalline saccharoid dolomite, with long white crystals of Tremolite, very like some specimens from the Val Tremola, St. Gothardt. Locality: Korhádi.

\* Read before the Royal Dublin Society in November 1858, in whose Museum most of the rocks and minerals are deposited.



Upon a chemical examination of the calcareous portion of this rock, I found it composed of—

Carbonate of lime . . . .	144 parts
Carbonate of magnesia . . . .	89 „

giving an atomic proportion of—

CaO, CO <sup>2</sup> . . . .	2.88	4
MgO, CO <sup>2</sup> . . . .	2.12	3

This rock is therefore a pure dolomite, and resembles in its chemical composition many of the metamorphic magnesian limestones.

No. 4. *Hislopite*.—Green calc-spar. Locality: Tákli.

This is a very remarkable mineral; it presents the crystalline form of calc-spar; its colour is a brilliant grass-green; and it effervesces briskly with weak hydrochloric acid, which dissolves its calcareous portion, leaving a beautiful green siliceous skeleton, similar to those to which M. Alphonse Gages has recently directed the attention of geologists.

I made a careful analysis of the whole rock and of its green skeleton, with the following results.—N.B. The quantity operated on was 39.31 grs.

*Green Calc-spar.*

	Actual weight.	Per cent.
Green siliceous skeleton . .	6.54	16.63
Alumina . . . . .	0.29	0.73
Carbonate of lime . . . .	31.76	80.79
Carbonate of magnesia . .		trace
	38.59	98.15

Spec. grav. = 2.645.

Upon fluxing the siliceous skeleton with carbonate of soda and potash, I found—

*Green Siliceous Skeleton.*

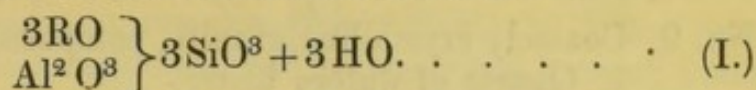
	Actual weight.	Per-centage.
Silica . . . . .	3.57	54.59
Alumina . . . . .	0.31	4.74
Peroxide of iron. . . . .	1.66	Protoxide . 22.84
Carbonate of lime . . . .	0.11	Lime . . 0.94
Pyrophosphate of magnesia .	0.90	Magnesia . 4.90
		Water & loss 11.99
		100.00

The mineral just described appears to me to be the *Glauconite* of the American mineralogists, described by Dana, Rogers, and others. I find its atomic proportions as follows:—



	Number of atoms.	Oxygen ratio.
Silica . . . . .	1213	1213
Alumina . . . . .	91	395
Protoxide of iron . . . . .	634	
Lime . . . . .	33	
Magnesia . . . . .	245	
Water . . . . .	1332	

From the oxygen ratio here given, I deduce the following mineralogical formula for this remarkable mineral:—



Or, Hydrated tersilicate of protoxide of iron.

The following analysis by Rogers, of Glauconite from the green grains of the greensand formation of New Jersey, will serve to show the probable identity of Glauconite with the green siliceous skeleton of the green calc-spar of Nágpur:—

	Per-centage.	Atoms.	Oxygen ratio.
Silica . . . . .	53.26	1183	1183
Alumina . . . . .	3.85	74	391
Protoxide of iron . . . . .	24.15	671	
Magnesia . . . . .	1.10	55	
Lime . . . . .	1.73	61	
Potash . . . . .	5.36	114	391
Soda . . . . .	1.60	51	
Water . . . . .	10.12	1124	
	101.17		

No formula has been proposed by Dana for Glauconite; but it is evident that the preceding analysis gives very exactly the formula (I.) found from Mr. Hislop's mineral. I propose to give the name of Hislopite to the remarkable combination of Calc-spar and Glauconite found by him at Nágpur: the two minerals mutually penetrate each other, the calc-spar giving a form to the whole, and constitute together a beautiful example of the mineralogical law to which attention has been directed by M. Gages.

No. 5. Doleritic lava, with amygdaloidal geodes and cavities, invariably lined with obsidian in a thin glazed pellicle, and occasionally filled up with tabular crystals of calc-spar. Locality: Sitavalli Hill.

*Var. α.* Dolerite, partly amygdaloidal; cavities lined with green earth, and sometimes filled with calc-spar in flat crystals. Same locality.



No. 6. Calc-spar, curiously striated; the lines of growth not being perpendicular to the optic axis, but formed by planes parallel to one of the edges of the obtuse trihedral angle of the rhombohedron, and intercepting equal portions on the other two edges of that angle. Locality: Tákli.

No. 7. Specimen of quartz rock from the Weiragad Diamond Mines. Deposited by the action of water.

No. 8. Graphic or letter-granite, composed of cream-coloured felspar and watery quartz. Locality: City of Nágpur.

No. 9. Coarsely crystalline granite, composed of—

1. Quartz of watery lustre.
2. *Hunterite*. White felspathic mineral of fatty lustre, softer than felspar, but gritty under the agate pestle.
3. Pink felspar, in large tabular crystals (1 in. by  $\frac{1}{2}$  in.), with brilliant reflexion.

The white felspathic mineral contained in this granite appeared to me so peculiar, that I analysed it carefully with the following results.—N.B. Quantity operated on = 27·56 grs.

*Fatty Felspathic Mineral.*

	Actual weight.	Per-centage.
Silica . . . . .	18·17 grs.	65·93
Alumina . . . . .	5·78 „	20·97
Lime (carbonate) . . . . .	0·15 „	Lime . 0·30
Magnesia (pyrophosphate). . . . .	0·35 „	Magnesia. 0·45
Loss by ignition . . . . .	3·20 „	11·61
Spec. grav. = 2·319.		99·26

The atomic proportions given by the preceding analysis are—

SiO <sup>3</sup> . . . . .	1465
Al <sup>2</sup> O <sup>3</sup> . . . . .	403
RO . . . . .	32
HO . . . . .	1290

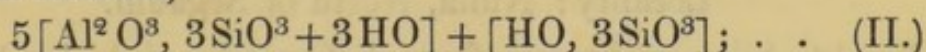
The silica here far exceeds in amount that found in any Kaolin, and in fact the relation of silica to alumina is much greater than is requisite to form orthoclase. In its present state, the waxy felspathic mineral of this granite, if it resulted from the decomposition of orthoclase, must have done so under circumstances that rendered the restoration of the silica removed as silicate of potash, an operation that proceeded *pari passu* with the decomposition of the felspar. The mineral presents no appearance of disintegration, its edges of separation from the pink felspar are well defined; and although its fatty lustre makes the mineralogist suspect the presence of water, yet it has all the appearance of a mineral formed in the bosom of the molten granite at the



time of its eruption (or deposition?). If so formed, it should not be considered as a decomposed mineral at all, but as an independent hydrated silicate of alumina, formed under great pressure and at a high temperature, water being present. In the granites of Leinster, the margarodite mica, which is present in large quantities, contains 5 or 6 per cent. of water; and yet it has never been, nor could it properly be, looked upon as the result of any metamorphic action on the rock.

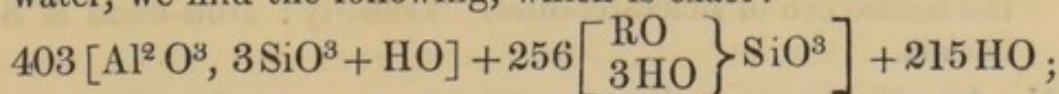
I believe the hydrated aluminous silicate of Nágpur to have been formed in the granite originally, or at least that, if it be the result of subsequent metamorphic action, the latter must have taken place at a high heat, and, as water was present, under a great pressure. If the destruction of orthoclase was necessary to its formation, as fast as the silicate of potash was removed by the heated water (probably red-hot), the silica must have been replaced, perhaps at the expense of the quartz of the granite, which is very abundant; or, which comes to the same, the metamorphosing agent was highly heated water under pressure, holding silica in solution, as we know it to be capable of doing to a very great extent.

In whatever point of view we regard this mineral, it must be considered one of great interest, in consequence of its being a hydrated aluminous silicate, without protoxide bases, and containing a proportion of silica to alumina the same as that found in orthoclase. I am of opinion that it is a new mineral species, and I would propose to call it *Hunterite*, in honour of one of the gentlemen who brought it to England. If we neglect the lime and magnesia, it may be regarded as having the following mineralogical formula,—

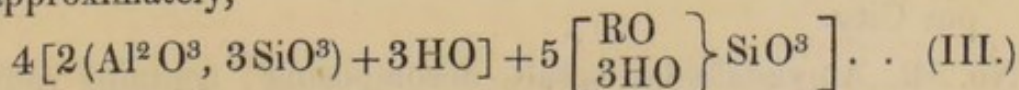


being, in fact, composed of five atoms of a hydrated tersilicate of alumina\* combined with one atom of a hyaline silica of admitted composition. It appears to me to be a confirmation of this view of the mineral, that in the gneiss that accompanies the granite of Nágpur, and is often undistinguishable from it, this fatty felspar often passes into yellow and pinkish opalescent minerals, with which it evidently has the closest relation.

If we take account of all the elements present, and adopt Scheerer's view of the replacement of magnesia by three atoms of water, we find the following, which is exact:—



or, approximately,



\* In fact, an *aluminous Glauconite*.



Whatever view be adopted as to the rational formula of this mineral, it is certain that part of its silica is in chemical combination with water; and if it be regarded as a metamorphic orthoclase, it is to be considered as one from which only  $\frac{5}{8}$ nds of the silica has been removed, and that the potash has been chemically replaced by water.

No. 10. Gneiss formed from the preceding granite, composed of—

1. Watery quartz.
2. Pink, white, and yellow opaline felspar, with a waxy lustre.

Locality: Nágpur City.

No. 11. Fine-grained granite, composed of—

1. Quartz.
2. White felspar.
3. White mica in lozenges.
4. Small crystals of garnet (abundant).

Locality: Korhádi.

No. 12. Gneiss, composed of—

1. Quartz.
2. Pink orthoclase felspar ( $\frac{1}{4}$  to  $\frac{1}{2}$  in.).
3. Epidote.

Locality: North of Segaum.

No. 13. Gneissose granite, composed of—

1. Quartz.
2. Red orthoclase felspar (predominant).
3. Blackish-green mica (abundant).
4. Epidote (traces).

Locality: Nullá, North of Segaum.

No. 14. Siliceous breccia, formed of angular pinkish-white opaque jasper ( $\frac{1}{2}$  in.), cemented by silicate of iron, forming a delicate green jasper. Locality: Tertiary beds of Telankhedi.

No. 15. Crystalline calcareous limestone, containing strings and patches of red hæmatite; possibly of some value as an iron ore. Locality: Korhádi.

No. 16. Crystalline calcareous limestone, with traces of grossularite; probably metamorphic. Locality: Korhádi.

No. 17. Brown hæmatite, in stratified nodular concretions; like the oolitic ore of Leicestershire. Locality: Iron-band of Sillewada.

No. 18. Black tourmaline crystals, in quartz. Locality: Nágpur City.

No. 19. Amygdaloidal basalt, decomposing; contains rounded cavities filled with green earth. Locality: Sitawaldi Hill.

