Barringtonite—A new hydrous magnesium carbonate from Barrington Tops, New South Wales, Australia

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Summary. Barringtonite, a new hydrous magnesium carbonate of composition $MgCO_3.2H_2O$, is recorded from Sempill Creek, Barrington Tops, New South Wales, where it occurs as nodular encrustations on the surface of olivine basalt. The mineral is triclinic, biaxial positive, has refractive indices $\alpha = 1{\cdot}458$, $\beta = 1{\cdot}473$, $\gamma = 1{\cdot}501$, $2V_\gamma = 73° 44'$, and using Ito's method (1949) cell dimensions $a = 9{\cdot}155$ Å, $b = 6{\cdot}202$ Å, $c = 6{\cdot}092$ Å, $\alpha = 94° 00'$, $\beta = 95° 32'$, and $\gamma = 108° 72'$. The three strongest lines on an X-ray powder photograph give d values of 8·682, 3·093, and 2·936 Å.

BARRINGTONITE occurs as nodular encrustations on the surface of Tertiary olivine basalt under Rainbow Falls, Sempill Creek, Barrington Tops, New South Wales. The surface of the basalt under the falls is continually wet from meteoric water which has a temperature of about 5° C. Barringtonite is formed as the result of this cold meteoric water percolating through olivine basalt and leaching magnesium from it.

The tiny nodules are composed of colourless radiating fibres or needles averaging 0·01 × 0·03 mm in size. Associated with the mineral is a small percentage of nesquehonite, $MgCO_3.3H_2O$.

Optical data. Refractive indices measured at 22° C are $\alpha = 1{\cdot}458$, $\beta = 1{\cdot}473$, and $\gamma = 1{\cdot}501$. Values for double refraction are $\beta - \alpha = 0{\cdot}015$, $\gamma - \beta = 0{\cdot}028$, and $\gamma - \alpha = 0{\cdot}043$ (maximum). The mineral is biaxial positive and the $2V$ was calculated to equal 73° 44′. It is length slow and appears to have good cleavage, probably parallel to the three pinacoids {001}, {100}, {010}. Examination of many sections revealed that the extinction angles measured from the slow vibration direction fell into three distinct groups of 17°, 23°, 34°. No section showed parallel extinction.

Chemical data. Two analyses, *A* and *B*, were carried out and the results of these together with the calculation of the chemical formula appear in table II. The difference in the chemical analyses is probably due to the presence of a little nesquehonite which is difficult to separate from the mineral under discussion.

TABLE I

Barringtonite				Nesquehonite		Lansfordite	
*I**	*d*	*I**	*d*	I/I_1	*d*	*I*	*d*
vs (1)	8·682	vw	1·539	100	6·5	7	6·42
s	6·087	vw	1·503	8	5·8	8	5·80
s	5·816	vw	1·485	8	4·96	2	4·46
vw	5·247	vw	1·465	80	3·86	10	4·16
vw	4·886	vw	1·432	16	3·58	10	3·85
w	4·672	vw	1·411	16	3·23	2	3·56
vw	4·431	vw	1·395	24	3·02	3	3·32
vw	4·231	vw	1·366	16	2·77	1	3·20
vvw	4·103	vw	1·351	48	2·61	3	3·04
vw	3·987		1·333	40	2·51	6	2·90
vw	3·877		1·313	8	2·35	3	2·78
w	3·760		1·292	16	2·17	3	2·69
w	3·164		1·275	8	2·01	3	2·61
vs (2)	3·093		1·251	32	1·92	5	2·50
m	3·023		1·228	8	1·83	2	2·30
vs (3)	2·936		1·208	24	1·79	3	2·20
m	2·718		1·179	16	1·71	5	2·15
w	2·625		1·168	8	1·64	2	1·993
s	2·495		1·146	12	1·55	3	1·928
w	2·407		1·133	8	1·50	1	1·850
w	2·356		1·123	8	1·45	1	1·802
s	2·309		1·083	8	1·43	1	1·742
m	2·191		1·065	8	1·39	1	1·720
w	2·121		1·048			3	1·617
w	2·067		1·036			2	1·572
m	2·017		1·005			1	1·533
m	1·949		0·989			1	1·502
m	1·922		0·984			1	1·456
m	1·846		0·973			1	1·422
m	1·802		0·962			1	1·401
m	1·755		0·954			1	1·332
vw	1·722		0·937			1	1·315
vw	1·691		0·906			1	1·257
m	1·680		0·892				
w	1·637		0·884				
w	1·595		0·877				
vw	1·569		0·872				

* vs = very strong, s = strong, m = medium, w = weak, vw = very weak, vvw = very very weak.

(1), (2), (3) indicate the three strongest lines.

Nesquehonite: Data from A.S.T.M. Index.

Landsfordite from Atlin, British Columbia, camera diameter 57·54 mm, Cu radiation, Ni filter. Data supplied by the Royal Ontario Museum, Toronto, Canada.

X-ray data. An X-ray powder photograph was taken on a 19-cm Unicam camera using Cu radiation and a Ni filter. The d spacings are listed in table I together with those of nesquehonite ($MgCO_3.3H_2O$) and lansfordite ($MgCO_3.5H_2O$) for comparison.

TABLE II

	Analysis *A*				Analysis *B*			
	Wt. %	Mol. wt.	Relative no. mols.	Approx. mol.ratio	Wt. %	Mol. wt.	Relative no. mols.	Approx. mol. ratio
MgO	31·8	40·32	0·7877	1	33·5	40·32	0·8308	1
CO_2	34·8	44·00	0·7909	1	36·5	44·00	0·8300	1
H_2O	33·4	18·00	1·8555	2·2	30·0	18·00	1·8666	2
Formula	$MgCO_3.2H_2O$				$MgCO_3.2H_2O$			

Because of the minute size of the needles it was impossible to separate 'cleanly' a single crystal. Therefore the reflections were indexed and the cell data obtained using Ito's (1949) method. This method yielded the following results:

Crystal system: Triclinic

Cell dimensions: $a = 9{\cdot}155$ Å, $b = 6{\cdot}202$ Å, $c = 6{\cdot}092$ Å; $\alpha = 94° 00'$, $\beta = 95° 32'$, $\gamma = 108° 72'$

Cell volume and content: $V = 283{\cdot}4$ Å^3, $Z = 4$.

Calculated density: 2·825.

Name. The mineral derives its name from Barrington, the locality from which is is first recorded.

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Reference

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