$FeO.Al_2O_3.4SiO_2$	9.52
$FeO.SiO_2$	48.97
$MnO.SiO_2$	37.99
$CaO.SiO_2$	3.83
H_2O	0.37
	100.68

Two other triclinic substances appear also to belong to the rhodonite-babingtonite group. One is the mineral sobralite,[24] a metasilicate of manganese, iron, lime, and magnesia, and the other is a slag product, called vogtite,[25] which is apparently like the triclinic babingtonite-like slag crystals described by Vogt.[26] These crystals have pyroxene-like cleavages and angles and were thought by their discoverers to belong with rhodonite and babingtonite.

Summary

New determinations of the chemical and optical properties and the density of babingtonite have been made. Its unlikeness to the monoclinic pyroxenes has been discussed. The arbitrary character of the boundaries of mineral groups, especially triclinic groups, is mentioned, and it is suggested that babingtonite, rhodonite, pyroxmangite, and sobralite are sufficiently alike, and also unlike the pyroxenes and other mineral groups, to be grouped by themselves.

MAGNESITE CRYSTALS FROM ORANGEDALE, NOVA SCOTIA

Lillian M. Dobbel, *Stanford University*

The unusual rarity of euhedral crystals of magnesite led the writer to make a special study of some obtained from Ward's Natural Science Establishment by Dr. A. F. Rogers a few years ago. The crystals come from a magnesite deposit near Orangedale, Inverness County, Nova Scotia, the occurrence of which was described by A. O. Hayes in 1916.[1]

According to Hayes, the deposit was discovered by Alexander McLeod on the farm of John Martin, McLean Point road, about

[24] J. Palmgren, *Bull. Geol. Inst. Univ. Upsala*, **14**, 109, (1917).

[25] C. Hlawatsch, *Zeits. Kryst.*, **42**, 590, (1907).

[26] J. H. L. Vogt, Studier over Slagger, **1**, 37, (1884); Mineralbildung in Schmelzmassen, **71**, (1892); Die Silikatschmelzlosungen, **1**, 47, (1903).

[1] Sessional Papers of the Canada Department of Mines, Vol. LII, No. 17, p. 277, (1917).

a mile east of Orangedale, and " . . . an open cut about five feet wide by fifteen feet east and west through about three feet of surface sand and clay exposed the magnesite. It is in a weathered and friable condition over the whole extent of the stripping. . . . Bedrock was not exposed in the cutting but small cores of dolomite occur in the magnesite and the six-sided prisms were found embedded in the cores. Fossiliferous dolomite interbedded with gypsum, probably forming part of the Windsor stage of the Carboniferous limestone series is well exposed about $\frac{1}{4}$ of a mile south of the magnesite prospect . . . Other outcrops of the Carboniferous limestone series occur to the north of the deposit, one within a few hundred feet, the other on the shore of the lake. The deposit of magnesite is apparently of secondary origin derived from the associated dolomites."

The magnesite crystals forming this friable mass range in size up to almost twelve millimeters in length, but of those used for measurements by the writer, none exceeded five millimeters. They vary in color from dark brown to almost colorless, and occur in two different crystal combinations which intergrade. Most common of these is the hexagonal prism with the pinacoid (fig. 1), while the other combination showed the presence of a new scalenohedral face *p*, together with a negative rhombohedron *f* (fig. 2). Associated with the magnesite are colorless rhombohedral crystals of dolomite. In the paper cited above, these were mentioned as another variety of magnesite and were described as "resembling a scalenohedron and nearly colorless." This is an error, however.

Qualitative analyses were made on both of the minerals. The magnesite yielded a heavy magnesium precipitate, with a small amount of calcium, and traces of iron and aluminum. The brown color of most of the crystals, which might be supposed to be due to the presence of iron, was found to be caused by organic matter. The analysis which Hayes gives for the weathered, crystalline magnesite is as follows:

$CaCO_3$	2.85
$MgCO_3$	90.80
Al_2O_3	1.01
Oxide of iron (all expressed as Fe_2O_3)	1.71
Silica and insoluble residue	0.30
Equivalent to CaO	1.60
MgO	43.53

Qualitative tests made on the dolomite gave large precipitates of both calcium and magnesium, with a small amount of iron.

Crystal Form of Magnesite

The predominating form is the second order prism *a* $\{11\bar{2}0\}$. The great majority of the crystals showed only this form, terminated by the pinacoid *c* $\{0001\}$. On the others observed, there were, in addition to the *a* and *c* faces, a negative rhombohedron *f* $\{02\bar{2}1\}$, and a negative scalenohedron *p* in the zone $[2\bar{1}\bar{1}0{:}02\bar{2}1]$. The symbol of this new scalenohedron was determined graphically by means of a gnomonic projection and found to be $\{4.8.\overline{12}.5\}$.

The following angles on the two crystals were measured with a reflecting goniometer:

	Average of:	Measured:		Calculated:	
a f $(11\bar{2}0 \wedge 02\bar{2}1)$	(3)	40°	5′	40°	10½′
$a^{v}p$ $(2\bar{1}\bar{1}0 \wedge 4.8.\overline{12}.5)$	(3)	72	59½	73	0½
p f $(4.8.\overline{12}.5 \wedge 02\bar{2}1)$	(3)	17	4	16	59½
$p'f$ $(\bar{8}.12.\bar{4}.5 \wedge 02\bar{2}1)$	(3)	16	55	16	59½
$a^{v}f$ $(2\bar{1}\bar{1}0 \wedge 02\bar{2}1)$	(3)	90	3⅔	90	00
pp' $(4.8.\overline{12}.5 \wedge \bar{8}.12.\bar{4}.5)$	(3)	33	59	33	59

The angle $(10\bar{1}1 \wedge \bar{1}101)$ was measured on a cleavage fragment and found to be 72°40⅓′ which agrees well with Koksharov's value (72°36⅓′).

Graphic Determination of the *p* Face

Since there are no tables of angles for magnesite, the new face was determined by graphical means, and then recalculated. In the graphic determination, the gnomonic projection was used as represented in fig. 3. As Rogers[2] has shown, the Penfield stereographic sheets may be used for the gnomonic projection as well. Scale no. 2 of these sheets gives the direct values of the angle tangents.

The $\{0001\}$ face appears as the point *c* in the center of the circle. The rhombohedral zone-lines are drawn as radii. The face *f* $\{02\bar{2}1\}$ is found by laying off the tangent of 61°55′ (according to scale no. 2) along zone-line *cM*. The prism face *a* $\{11\bar{2}0\}$ is projected at infinity, and hence is represented by an arrow on

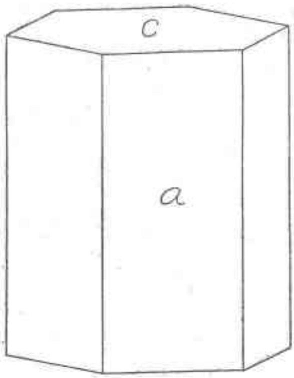
[2] School of Mines Quarterly, Vol. 29, pp 24-33, (1907).

the radial zone-line midway between the positive and negative rhombohedral zone-lines. Point L is located on the edge of the circle, where the zone-line ca^v and the circle intersect. Through f a line is drawn parallel to cL, (zone $[0001{:}2\bar{1}\bar{1}0]$), shown on the figure by the zone-line Da^v. Through L, and with f as the center, an arc is drawn, and the point where the arc cuts the projection of the line cf beyond c is called N, the *angle point* of the zone $[02\bar{2}1{:}2\bar{1}\bar{1}0]$. Using N as a center, an angle of 17°4′ (the measured value of pf) was laid off from line fN as shown in the figure by angle pNf, in order to find the face p which lies on the zone line Da^v. The tangent of 43°8′ $(0001\wedge10\bar{1}1)$ was marked off from the center along the zone-line cE to locate r $\{10\bar{1}1\}$, and also along zone-line cM to locate $\{01\bar{1}1\}$. Perpendiculars were drawn through p, f, and $\{01\bar{1}1\}$ to the zone-line ca', and through r and p to the zone-line ca^v. G is the point where the perpendicular from r $\{10\bar{1}1\}$ to the ca^v zone-line cuts the circle. Similarly point K is the intersection of the line from $\{01\bar{1}1\}$ perpendicular to the zone-line ca' with the circle, and point Q is the intersection of the zone-line cM with the circle. The three unit scale lines may now be drawn in. A line through Q perpendicular to the zone-line ca' locates one scale line; the line cG locates another, and cK is the third. Where cK extended cuts the perpendicular from p to the zone-line ca' determines the point Z, and the point where cG intersects the perpendicular from p to the zone-line ca^v is called R. The zone-line ca is drawn, and the point where this line cuts the scale line QH is J. The distance QJ is then the unit distance. Next, the line cp is drawn in and cp cuts the scale line QH at point F. The following distances were measured by means of scale no. 4 of the Penfield sheet:

$$\frac{QF}{QJ}=\frac{1}{2} \quad \text{or} \quad \frac{k}{h}=\frac{1}{2}$$

$$\frac{cZ}{cK}=\frac{8}{5} \quad \text{or} \quad \frac{h}{l}=\frac{8}{5}$$

$$\frac{cR}{cG}=\frac{4}{5} \quad \text{or} \quad \frac{k}{l}=\frac{4}{5}$$



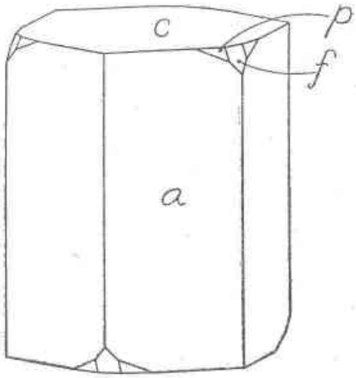


FIG. 1 FIG. 2
Magnesite Crystals from Orangedale, Nova Scotia
$c=\{0001\}$, $a=\{11\bar{2}0\}$, $f=\{02\bar{2}1\}$, $p=\{4.8.\overline{12}.5\}$.

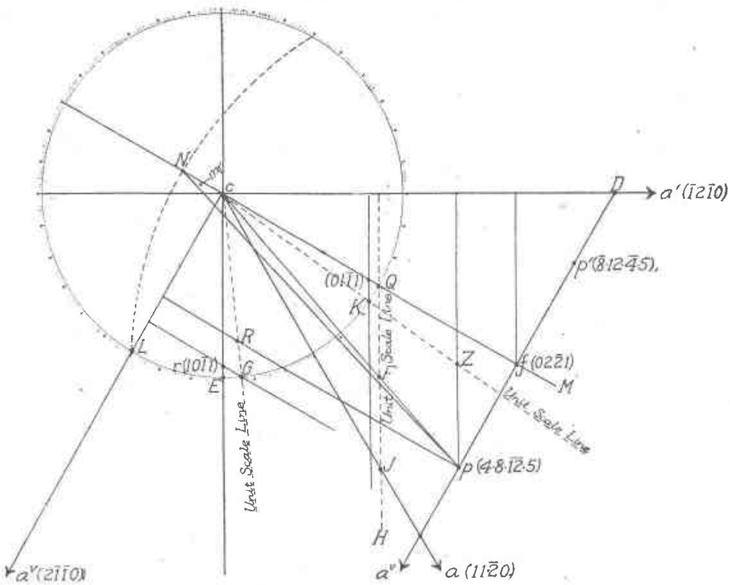


FIG. 3. Graphic Determination of a New Scalenohedron Face on Magnesite (made on a Penfield Stereographic Sheet)

The final step is to find the symbol of a face of the type $\{k.h.\overline{h+k}.1\}$ that will satisfy these conditions. This is one having 4 as the first term, 8 as the second, and 5 as the fourth, or $\{4.8.\overline{12}.5\}$. This, then, represents the negative scalenohedron p, a form new for magnesite, but one known for calcite.

Angle Measurements for Dolomite

The colorless associated mineral, already determined as dolomite by qualitative tests, was shown to be such by a study of the geometrical properties of its crystals. Various crystals were examined and it was found that the only forms present were the two positive rhombohedrons, $M\ \{40\bar{4}1\}$ and $r\{10\bar{1}1\}$, and the pinacoid $c\ \{0001\}$. The *M* face was the most prominent. Measurements were made with a reflecting goniometer, and the following averages were obtained:

	Average of:	Measured:		Recorded value:	
$c\ M$ $(0001 \wedge 40\bar{4}1)$	(3)	75°	38⅓′	75°	25′
$c\ r$ $(0001 \wedge 10\bar{1}1)$	(3)	44	1⅔	43	51½
$M\ M'$ $(40\bar{4}1 \wedge \bar{4}401)$	(3)	113	53	113	53

Thanks are due Dr. Austin F. Rogers for invaluable assistance in the preparation of this paper.

PROCEEDINGS OF SOCIETIES

PHILADELPHIA MINERALOGICAL SOCIETY

Academy of Natural Sciences, Sept. 13, 1923

A stated meeting of the Philadelphia Mineralogical Society was held on the above date with the President, Mr. Vaux, in the chair. Fourteen members were present. Mr. J. L. Darlington, having received the endorsement of the Executive Committee, was unanimously elected to membership in the Society. Reports of summer trips constituted the program of the evening.

Mr. Biernbaum reported on a trip which included some of the less known mineral localities of Connecticut and New York. Altogether thirty-six localities were visited and numerous specimens obtained. The trip included the following important localities: Bedford, N. Y.—A quarry one mi. from the old locality where abundant rose quartz of good quality was found. Branchville, Conn.—Curved muscovite. Roxbury, Conn.—A specimen of finely crystallized siderite found in gneiss was exhibited. Roxbury Falls, Conn.—Garnets. W. Redding, Conn.—Brilliant red garnets (Essonite). The finds were of good quality but not of the gem variety. Danbury, Conn.—An attempt was made to locate the type locality of danburite. The only indication was an abandoned silver mine, which may have been the source of the material. Haddam, Conn.—On the dumps near the old Lepidolite mine, interesting mammillary forms of this mineral were found. A road cut beyond the mine yielded microcline and beryl, also fine doubly terminated tourmaline. Rock Landing Quarry, No. 2—Located half mile north of old Rock