

AUSTRALIAN MUSEUM SCIENTIFIC PUBLICATIONS

Anderson, C., 1909. Mineralogical notes. No. VIII. Topaz, anglesite, and other Australian minerals. *Records of the Australian Museum* 7(4): 274–282, plates lxxix–lxxxii. [30 August 1909].

doi:10.3853/j.0067-1975.7.1909.971

ISSN 0067-1975

Published by the Australian Museum, Sydney

nature culture **discover**

Australian Museum science is freely accessible online at
<http://publications.australianmuseum.net.au>
6 College Street, Sydney NSW 2010, Australia



MINERALOGICAL NOTES : No. VIII.—TOPAZ, ANGLE-SITE, AND OTHER AUSTRALIAN MINERALS.

By C. ANDERSON, M.A., D.Sc. (EDIN.), Mineralogist.

(Plates lxxix.-lxxxii.)

TOPAZ.

CARPET SNAKE CREEK, NEAR TORRINGTON, N. S. WALES.

(Plate lxxix., figs. 1, 2.)

The specimens here described consist of a small lot of isolated crystals and a fragment of matrix carrying one magnificent crystal and several smaller ones; they were acquired by the Trustees from Mr. Charles Bogenrieder, Mining Engineer. The figured crystal, which measures $0.8 \times 1.5 \times 3.25$ cm., is loosely attached to a matrix consisting of a clayey decomposition product (evidently felspathic), quartz, wolfram, molybdenite, and a small quantity of a purplish mineral too minute for determination, but which is in all probability fluor spar. The topaz is closely moulded on the accompanying minerals, which therefore preceded it in most cases. No information is available regarding the geological conditions of its occurrence, but the hand specimen indicates a decomposed pegmatite vein as its original home.

The crystals are colourless, transparent, and of a uniform habit, belonging to the Russian domatic type; the crystallographic characters are very similar to those of the Emmaville topaz.¹ The faces, with the exception of the base which is always more or less rough, are highly polished and give good signals. Prism forms are numerous, m (110) being the best developed; l (120) has fairly large faces, but other forms in this zone are very narrow. Of the domes, f (021) and d (201) are prominent, y (041) and h (203) small; o (221) and u (111) are the most important pyramids. An interesting feature is the presence on the m faces of very distinct, quadrangular markings, resembling the

¹Anderson—Austr. Mus. Rec., v., 1904, pp. 296-299; *ib.*, vi., 1905, pp. 83-85.

“wachtums-figures” described by Goldschmidt on the topaz from the Thomas Range, Utah.² The prism faces in general show a slight vertical striation. The dome *d* is striated somewhat irregularly in a direction parallel to its intersection with *o*; this is not due to oscillatory combination, but to etching, and, now and then, indications are seen of a definite etch-figure shaped somewhat like a pear with the blunt end directed upwards. The faces of *y* and *f* inter-oscillate.

Five crystals were measured on the two-circle goniometer; the mean angles obtained are tabulated below, together with the calculated values given by Goldschmidt³ (Dana's axes and lettering are adopted).

Forms.		Measured		Calculated.		Difference.	
		ϕ	ρ	ϕ	ρ	ϕ	ρ
<i>c</i>	001	—	—	—	—	—	—
<i>b</i>	010	0 6	90 0	0 0	90 0	6	0
<i>N?</i>	210	75 0	—	75 12	„	12	0
<i>m</i>	110	62 7 $\frac{1}{3}$	90 0	62 8	„	2 $\frac{2}{3}$	—
<i>O?</i>	560	57 38	89 58	57 37	„	1	2
<i>M</i>	230	51 42	89 58	51 35	„	7	2
<i>r?</i>	7-13-0	46 1	—	45 32	„	29	—
<i>l</i>	120	43 25	90 0	43 25	„	0	0
<i>u?</i>	5-11-0	40 32	—	40 42	„	10	—
π	250	37 4	90 2	37 7	„	3	2
<i>g</i>	130	32 18	89 59	32 14	„	4	1
<i>n</i>	140	25 19	89 59	25 19	„	0	1
<i>f</i>	021	0 0	43 38	0 0	43 39	0	1
<i>y</i>	041	0 2	62 24	„	62 20	2	4
<i>h</i>	203	90 1	31 16	90 0	31 2	1	14
<i>d</i>	201	90 0	61 1	„	61 0	0	1
<i>i</i>	223	62 6	34 16	62 8	34 14	2	2
<i>u</i>	111	62 9	45 36	„	45 35	1	1
<i>o</i>	221	62 7 $\frac{1}{2}$	63 55	„	63 54	1 $\frac{1}{2}$	1
<i>x</i>	243	43 20	41 10	43 25	41 12	5	2

Of the doubtful faces *N* and *r* were observed twice (images not good), *O* and π once each (images fairly good).

²Goldschmidt—Zeits. Kryst., xl., 1905, pp. 379, 382, pl. x., fig. 6b.

³Goldschmidt—Krystallographische Winkeltabellen, 1897, pp. 346-348.

The observed combinations are shown in the following table (ii. is the figured crystal).

Cryst.	<i>c b N m O M r l u π g n f y h d i u o x</i>
i.	<i>c b — m — M — l — π g n f y h d i u o x</i>
ii.	<i>c b — m O M — l — π g n f y h d i u o x</i>
iii.	<i>c b N m — M — l — π g n f y — d — u o x</i>
iv.	<i>c b — m — M — l — π g n f y h d i u o —</i>
v.	<i>c b N m O M r l u π g — f y h d i u o x</i>

From the means of a large number of excellent measurements yielded by the forms *m* and *o* the following axial ratio was calculated:—*a* : *b* : *c* = ·52894 : 1 : ·47754.

GYP SUM.

MOUNT ELLIOTT MINE, CHILLAGOE DISTRICT, QUEENSLAND.

(Plate lxxix., fig. 3.)

At this mine very fine examples of crystallised selenite are found in association with native copper; I am told that prismatic crystals ten feet in length have been obtained. The crystal figured measures $2 \times 1.5 \times 20$ cm.; it is terminated by the fibrous fracture parallel to $t(\bar{1}01)$ and twinned on $a(100)$. The forms were determined by measurement with a contact goniometer, the approximate angles obtained being:—

$$b(010) \wedge \delta(350) = 41^\circ; \text{ calc. } 41^\circ 22'.$$

$$b(010) \wedge m(110) = 55^\circ; \text{ calc. } 55^\circ 44'.$$

ANGLESITE.

PROPRIETARY MINE, BROKEN HILL, N. S. WALES.

(Plate lxxx., fig. 1.)

Some brilliant colourless crystals of about 3 mm. diameter, associated with crystallised iodyrite and marshite, were observed on a limonitous matrix from this mine. Two crystals were measured and found to be anglesite of a type quite different from previously described Broken Hill anglesite.⁴ The most prominent faces belong to $a(100)$, $o(011)$, $y(122)$; $m(110)$ and a inter-

⁴Toborffy—Ann. Mus. Nat. Hung., v., 1907, pp.494-496, pl.xi., figs.1-6; *Id.*—Zeits. Kryst., xlv., 1908, pp. 601-603, pl. xi., figs. 1-6; Anderson—Austr. Mus. Rec., vii., 1908, pp. 63-65, pl. xiv.

oscillate and are deeply striated; *a* (018) is doubtfully present as striated, slightly irregular planes giving poor reflections.

MEAN ANGLES.

Forms.		Measured.		Calculated.		Difference.	
		ϕ	ρ	ϕ	ρ	ϕ	ρ
		° ' ,	° ' ,	° ' ,	° ' ,	' ,	° ' ,
<i>c</i>	001	—	—	—	—	—	—
<i>a</i>	100	90 0	90 0	90 0	90 0	0	0
<i>m</i>	110	51 57	89 59	51 51	„	6	1
<i>a</i> ²	018	—	10 14	0 0	9 9	—	1 5
<i>o</i>	011	0 1	52 11	„	52 12	1	1
<i>d</i>	102	89 57	39 24	90 0	39 23	3	1
<i>z</i>	111	51 54	64 25	51 51	64 24	3	1
	122	32 31	56 49	32 29	56 48	2	1

MONTALBION, WALSH AND TINAROO DISTRICT, QUEENSLAND.

(Plate lxxx., fig. 2.)

The occurrence of anglesite at the Montalbion mines has been noticed by Skertchly.⁵ One specimen in which crystals of clear, colourless anglesite are seated on sandstone is in our collection. The habit is fairly uniform, the best developed forms being *m*(110) and *d* (102); *c* (001) and *d* are striated parallel to their intersections, but the reflections are generally good.

MEAN ANGLES.

Forms.		Measured.		Calculated.		Difference.	
		ϕ	ρ	ϕ	ρ	ϕ	ρ
		° ' ,	° ' ,	° ' ,	° ' ,	' ,	' ,
<i>c</i>	001	—	—	—	—	—	—
<i>b</i>	010	0 2	90 0	0 0	90 0	2	0
<i>m</i>	110	51 52	90 0	51 51	„	1	0
<i>o</i>	011	0 2	52 9	0 0	52 12	2	3
<i>d</i>	102	90 0	39 22	90 0	39 23	0	1
<i>z</i>	111	51 52	64 22	51 51	64 24	1	2
<i>r</i>	112	51 53	46 13	„	46 14	2	1
<i>p</i>	324	62 21	54 15	62 22	54 16	1	1

⁵Skertchly—Geol. Survey Q'land, Publication No. 119, 1897, pp. 29, 30.

AZURITE.

MULDIVA, WALSH AND TINAROO DISTRICT, QUEENSLAND.

(Plate lxxx., fig. 3.)

This occurrence of azurite has been known for many years,⁶ but its crystallography has not been investigated. A specimen, probably from the Paisley Mine, was recently secured by exchange with the Geological Survey of Queensland; it consists of numerous good crystals measuring up to about $5 \times 1.5 \times 1$ cm. accompanied by small crystals of cerussite on a matrix of limonite. The crystals are constant in habit; elongated parallel to the b axis, a (100), m (110) and θ ($\bar{1}01$) having the largest faces. The dome faces are striated parallel to their edges. Five crystals were measured. Combinations are tabulated below.

Cryst.	c	a	m	w	l	f	p	σ	θ	η	v	h	k	o
i.-ii.	c	a	m	w	l	f	p	σ		η	v	h	k	o
iii.	c	a	m	w	l	f	p	σ	θ	η	—	—	k	o
iv.	c	a	m	w	l	f	p	σ	θ	—	—	—	k	o
v.	c	a	m	—	l	f	p	σ	θ	η	v	h	k	o

MEAN ANGLES.

Forms.		Measured.				Calculated.				Difference.	
		ϕ		ρ		ϕ		ρ		ϕ	ρ
c	001	90	0	2	24	90	0	2	24	0	0
a	100	89	57	89	59	„	„	90	0	3	1
m	110	49	25	89	59	49	39	„	„	14	1
w	120	30	18	89	59	30	29	„	„	11	1
l	023	4	0	30	45	4	5	30	28	5	17
f	011	2	48	41	37	2	43	41	23	5	14
p	021	1	27	60	32	1	22	60	25	5	7
σ	101	90	0	47	2	90	0	47	10	0	8
θ	$\bar{1}01$	90	1	44	46	90	0	44	51	1	5
η	$\bar{3}02$	90	1	56	53	„	„	56	32	1	21
v	$\bar{2}01$	90	1	63	49	„	„	63	47	1	2
h	221	50	2	70	16	50	13	70	2	11	14
k	$\bar{2}21$	48	51	69	38	49	4	69	36	13	2
o	$\bar{2}41$	30	2	76	16	29	58	76	11	4	5

⁶Skertchly—*Loc. cit.* p. 36.

GIROFLA MINE, CHILLAGOE, QUEENSLAND.

(Plate lxxx., figs. 4, 5.)

This occurrence is represented in the Museum Collection by an exceedingly fine specimen of crystallised azurite associated with malachite and chalcocite. The azurite is of two generations, the earlier consisting of long prismatic crystals (to $10 \times 2.5 \times 1.5$ cm.) of a deep velvety-blue colour and almost iridescent. The azurite is partly changed to malachite, which forms embedded patches of a vivid green; the later generation of smaller, better developed crystals implanted on the older azurite and in cavities is unaltered and well adapted for goniometric determination. The whole forms an extremely beautiful object.

Four crystals were measured; they are tabular on μ ($\bar{1}05$) and elongated parallel to the b axis. The largest faces are those of a (100), m (110) and μ ; the base and the orthodome faces are strongly striated, as shown in the figures, and their signals overlap slightly. The following combinations were observed (iv. is figured).

Cryst.	c	a	m	p	σ	μ	n	θ	η	h	Q	o	e
i.	c	a	m	p	σ	μ	n	θ	η	—	—	—	—
ii.	c	a	m	p	σ	μ	n	θ	η	h	Q	—	—
iii.	c	a	m	—	σ	μ	n	θ	η	h	Q	—	—
iv.	c	a	m	p	σ	μ	n	θ	η	h	Q	o	e

MEAN ANGLES.

Forms.		Measured.		Calculated.		Difference.	
		ϕ	ρ	ϕ	ρ	ϕ	ρ
c	001	89 56	2 14	90 0	2 24	4	10
a	100	89 59	89 58	90 0	0	1	2
m	110	49 26	89 58	49 39	25	13	2
p	021	1 19	60 24	1 22	60 25	3	1
σ	101	89 59	47 1	90 0	47 10	1	9
μ	$\bar{1}05$	90 10	10 11	90 0	9 23	10	48
n	$\bar{1}02$	90 9	25 27	25 28	28	9	1
θ	$\bar{1}01$	90 1	44 51	44 51	51	1	0
η	302	90 2	56 41	56 32	32	2	9
h	221	49 58	69 57	50 13	70 2	15	5
Q	223	50 59	43 3	51 19	43 12	20	9
o	241	29 53	76 17	29 58	76 11	5	6
e	245	27 50	38 34	27 53	38 33	3	1

PHOSGENITE.

BROKEN HILL, N. S. WALES.

(Plate lxxxii., figs. 1, 2.)

The description is founded on a hand specimen of $6 \times 5\frac{1}{2}$ cm. almost entirely composed of stout prismatic crystals colourless and nearly transparent. The figured crystal is a fragment of $8 \times 4 \times 4$ mm., terminated below by the basal cleavage. The largest faces are c (001), m (110) and a (100), but the development is very irregular. The faces are in general somewhat etched, but the reflections are good. The m prism is slightly striated in the vertical direction.

MEAN ANGLES.

Forms.		Measured.		Calculated.		Difference.	
		ϕ	ρ	ϕ	ρ		ρ
		°	'	°	'	°	'
c	001	—	—	—	—	—	—
a	100	0	6	90	0	0	0
m	110	45	0	90	0	45	0
u	120	26	30	89	59	26	34
o	201	0	8	65	23	0	0
x	111	45	4	56	57	45	0
w	221	45	3	72	2	72	0
s	211	26	19	67	37	26	34
						67	40
						15	3

MONAZITE.

TRUNDLE, NEAR CONDOBOLIN, N. S. WALES.

(Plate lxxxii., figs. 3, 4.)

We are indebted to Mr. Charles Bogenrieder for the loan of a collection of isolated crystals, the largest measuring approximately 3 cm. in greatest diameter. The colour is reddish-brown, the lustre good, but the faces in general are imperfect, being wavy and irregular. In habit they are tabular on a (100); v (111) is a fairly large form. A probable new form, ρ ($\bar{1}03$) is present as a rather large face, which, however, is wavy and gives only an approximate measurement. The pinacoid a is slightly striated

vertically. Three crystals were measured; the figures show a typical, partly idealised crystal with all the recognised forms except *g*.

MEAN ANGLES.

Forms.		Measured.			Calculated.			Difference.	
		ϕ		ρ	ϕ		ρ	ϕ	ρ
<i>c</i>	001	90	2 13	53	90	0 13	40	2	13
<i>a</i>	100	90	7 90	0	„	90	0	7	0
<i>m</i>	110	46	40 90	1	46	43	„	3	1
<i>n</i>	120	28	9 90	3	27	58	„	10	3
<i>g</i>	012	28	1 27	54	27	43	27	36	18
<i>e</i>	011	14	28 43	40	14	43	43	44	15
<i>u</i>	021	7	21 61	41	7	29	61	49	8
<i>x</i>	$\bar{1}01$	90	3 36	14	90	0 36	29	3	15
* ρ	$\bar{1}03$	—	3 36		„	4 50		—	1 14
<i>v</i>	$\bar{1}11$	38	44 49	35	38	37 49	50	7	15
<i>d</i>	$\bar{1}12$	28	43 27	40	28	12 27	42	31	2

CALIFORNIA CREEK, MT. GARNET, QUEENSLAND.

(Plate lxxi., fig. 5.)

This crystal, kindly lent by the Director of the National Museum, Melbourne, measures $1 \times 3 \times 2.5$ cm. in the directions of the axes *a*, *b*, *c* respectively. It is brown in colour and is attached to a matrix of quartz and decomposed mica. In habit it is tabular on $a(100)$; the faces are dull, and, for determination, pieces of cover-glass were attached; thus the angles obtained are approximate only. The probable new forms, $\rho(\bar{1}03)$ and $\sigma(\bar{3}01)$ were determined by the following measurements with contact goniometer:—

$$a' \wedge \sigma = 20^\circ, \text{ calc. } 20^\circ 17'.$$

$$a \wedge \rho = 94\frac{1}{2}^\circ, \text{ calc. } 94^\circ 50'.$$

In all ten forms are present, namely:—*c* (001), *a* (100), *m* (110), *l* (210), *x* ($\bar{1}01$), ρ ($\bar{1}03$), σ ($\bar{3}01$), *v* ($\bar{1}11$), *i* ($\bar{2}11$), *z* ($\bar{3}11$).

CERUSSITE.

TOLWONG MINE, NEAR MARULAN, N. S. WALES.

(Plate lxxxi., fig. 6.)

The handspecimen consists of stout prismatic cerussite elongated parallel to the a axis, accompanied by galena, siderite, and pyrite. The cerussite is coated with galena so that the crystals are quite dark and opaque; they preserve their polish, however, and reflect well.

MEAN ANGLES.

Forms.		Measured.				Calculated.				Difference.	
		ϕ		ρ		ϕ		ρ		ϕ	ρ
		°	'	°	'	°	'	°	'	'	'
<i>b</i>	010	0	0	90	0	0	0	90	0	0	0
<i>m</i>	110	58	37	90	0	58	37			0	0
<i>x</i>	012	0	0	19	50	0	0	19	52	0	2
<i>k</i>	011	0	1	35	59			35	52	1	7
<i>i</i>	021	0	2	55	21			55	20	2	1
<i>v</i>	031	0	3	65	11			65	15	3	4
<i>p</i>	111	58	38	54	17	58	37	54	14	1	3

EXPLANATION OF PLATE LXXIX.

TOPAZ.

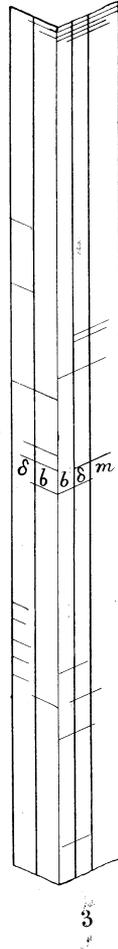
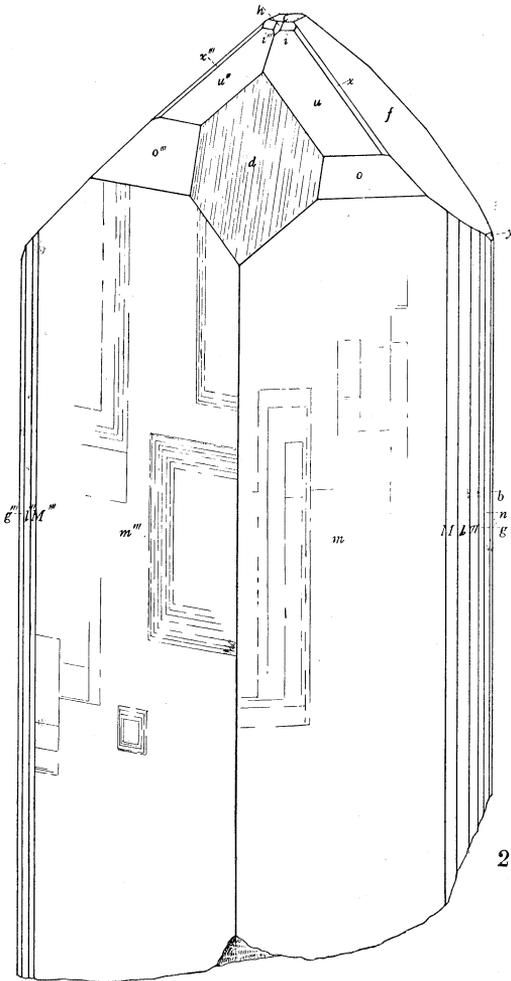
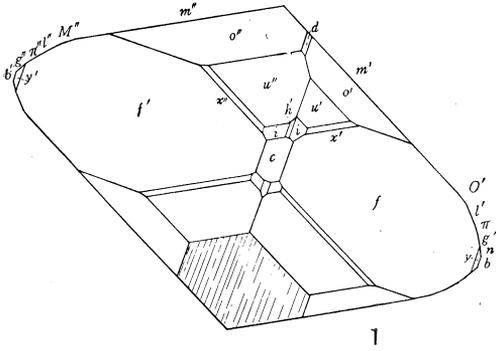
Figs. 1, 2. Carpet Snake Creek, near Torrington, N. S. Wales; orthographic and clinographic projection.

Forms.—*c* (001), *b* (010), *m* (110), *O* (560), *M* (230), *l* (120), π (250), *g* (130), *n* (140), *f* (021), *y* (041), *h* (203), *d* (201), *i* (223), *u* (111), *o* (221), *x* (243).

GYPSUM.

Fig. 3. Mt. Elliott Mine, Chillagoe, Queensland; twinned on *a* (100). Orthographic projection on (010).

Forms.—*b* (010), *m* (110), δ (350).



EXPLANATION OF PLATE LXXX.

ANGLESITE.

Fig. 1. Proprietary Mine, Broken Hill, N. S. Wales.

Fig. 2. Montalbion, Queensland.

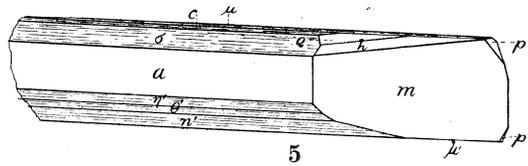
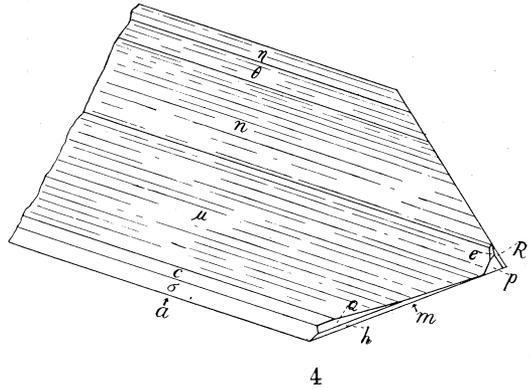
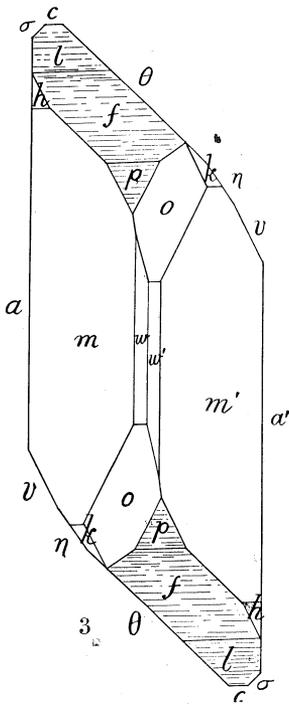
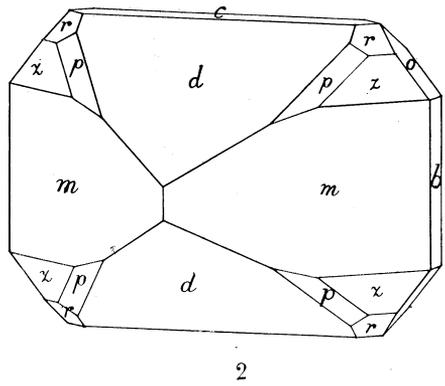
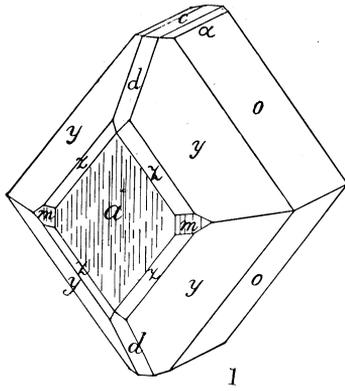
Forms.— c (001), b (010), a (100), a (018), o (011), d (102), z (111), r (112),
 p (324), y (122).

AZURITE.

Fig. 3. Muldiva, Queensland. Orthographic projection on (010).

Figs. 4, 5. Girofla Mine, Chillagoe, Queensland. Orthographic and clinographic projection.

Forms.— c (001), a (100), m (110), w (120), l (023), f (011), p (021),
 σ (101), μ (105), n (102), θ (101), η (302), v (201), h (221),
 Q (223), k (221), o (241).



EXPLANATION OF PLATE LXXXI.

PHOSGENITE.

Figs. 1, 2. Broken Hill, N. S. Wales. Orthographic and clinographic projection.

Forms.— c (001), a (100), m (110), u (210), o (201), x (111), w (221), s (211).

MONAZITE.

Figs. 3, 4. Trundle, N. S. Wales. Orthographic and clinographic projection.

Fig. 5. California Creek, Queensland.

Forms.— c (001), a (100), m (110), n (120), l (210), g (012), e (011),
 u (021), x (101), ρ (103), σ (301), v (111), d (112), i (211), z (311).

CERUSSITE.

Fig. 6. Talwong Mine, near Marulan, N. S. Wales.

Forms.— b (010), m (110), x (012), k (011), i (021), v (031), p (111).

[The following corrections were published in the Table of Contents
for Volume 7 in February, 1910—Sub-Editor, September, 2009]

CORRECTIONS.

- Page 132, line 11—add “*C.*”
,, ,, line 22—delete “*u.*”
,, 213, line 5—for “*bullocki*” read “*bullockii*.”
,, 214, line 4—for “*œmula*” read “*œmula*.”
,, 215, line 13 from the bottom—for “silk on *stabilimentum*” read
“silk or *stabilimentum*.”
,, 221, line 22—for “Belle View Hill” read “Belle Vue Hill.”
,, 262—*Chiton torri*, Hedley and Hull. As this name is preoccupied
by Mr. H. Suter (Proc. Malac. Soc., vii., 1907, p. 295) for a
New Zealand species, the Australian shell may be known as
Chiton torriana, Hedley and Hull.
,, 270, line 4—for “*avicircularia*” read “*avicularia*.”
,, 285, line 3—for *Bothriembryon gunni*” read “*Bothriembryon gunnii*.”
,, 285, line 8—for “*Bulinus gunni*” read “*Bulinus gunnii*.”
,, 285, line 14—after “Mt. Farrell” insert “Family Helicidæ,”
,, 330, under heading No. 5, line 3—after “Adelaide” insert
“Johnston.”
,, 331, line 1—omit “8.”
,, ,, line 8—for “9” read “8.”
,, ,, line 12—for “10” read “9.”
,, 335, line 11—for “Australia” read “Australian human.”
,, 336, under heading 23, line 2—omit the comma after “which.”
Plate xiii., explanation—lines 3 and 5 for “Inorthographic” read
“Orthographic.”
,, l., explanation—for “Amboipo” read “Amboiba.”
,, li., explanation—for “Amboida” read “Amboiba.”
,, liii., explanation—for “Amboida” read “Amboiba.”
,, lxiii., explanation—for “*Gasteracantya*” read “*Gasteracanika*.”
,, lxxii., explanation—for “fig. 28” read “fig. 23.”
,, lxxxi.—transpose 2 and 3.