ART. XLII.—*Mineralogical Notes*; by L. V. PIRSSON.

1. *Cerussite*.—Some specimens of cerussite, obtained through Messrs. English & Co., of New York, from the Red Cloud Mine in Yuma Co., Arizona, contain twin crystals in which the twinning plane is the uncommon form $i\bar{3}$, 130. Since, moreover, they show some unusual developments in their crystal form, it has been thought that a description of them would be of interest. The specimens are in the cabinet of Prof. George J. Brush.

The greater number of those observed have the form shown in fig. 1, which presents them in a basal projection. This

gives a much better idea of these crystals, shaped like arrow-heads, than an orthographic projection. They are of various sizes up to half an inch in length, the largest observed. They

resemble the example of this method of twinning given by Kokscharow* in the development of the brachydomes. The figure shows them in ideal symmetry; they are generally attached by the barb-shaped end; sometimes one barb or individual is free with the faces developed as in the figure; in other forms both individuals are attached and the barb-like part is wanting. They occur on the specimen seen, with cerargyrite and wulfenite. The forms observed on these crystals are:

r , $i\bar{3}$, 130; k , $1\bar{x}$, 011; v , $3\bar{x}$, 031; x , $\frac{1}{2}\bar{x}$, 012; m , I, 110; p , 1, 111.

Also the pinacoids $i\bar{2}$, 100 and $i\bar{2}$, 010, the pyramid $\frac{1}{2}$, 112 and the brachy-diagonal pyramid $2\bar{2}$, 121 have been identified in zones on the reflecting goniometer and measured with some accuracy, but they are too minutely developed to give any character to the crystals and are hence omitted in the figures. The crystals are well suited for measurement, the faces generally giving good reflections of the signal.

Fig. 2 shows a crystal from the same place with a different habit, the large $\frac{1}{2}$ brachydome x and great development of the brachy-prism r having resulted in a long spindle-shape form. Fig. 3 shows the same individual in basal projection. It occurred, attached at the end with the re-entrant angle, which in consequence was somewhat broken. Otherwise the crystal is quite perfect and in size about an inch long. The zone of brachydomes is somewhat striated, causing a rounding off toward the point. The signals of the prominent faces are, however, very distinct and give good measurements. On this crystal the forms observed were:

b , $i\bar{x}$, 010; c , O , 001; r , $i\bar{3}$, 130; k , $1\bar{x}$, 011; x , $\frac{1}{2}\bar{x}$, 012.

The following table shows the identification of the forms by calculated and measured (supplementary) angles.

		Calculated.	Measured.
$k \wedge p$	011 $\wedge$ 111	43° 50' 40"	43° 51'
$m \wedge p$	110 $\wedge$ 111	35 46 20	35 45, 35 50, 35 49
$k \wedge r$	011 $\wedge$ 130	59 03 10	59 00
$p \wedge p$	111 $\wedge$ 111	49 59 30	49 58
$m \wedge r$	110 $\wedge$ 130	29 57 30	30 00, 30 01
$p \wedge r$	111 $\wedge$ 130	45 19 55	45 16, 45 22
$v \wedge v$	031 $\wedge$ 031	49 30	49 27
$k \wedge x$	011 $\wedge$ 012	15 59 30	16 00, 16 04
$k \wedge k$	011 $\wedge$ 011	108 16	108 12, 108 14
$r \wedge x$	130 $\wedge$ 012	72 38 30	72 35
$c \wedge x$	001 $\wedge$ 012	19 52 30	19 48
$r \wedge b$	130 $\wedge$ 010	28 39 30	28 37, 28 31
$k \wedge b$	011 $\wedge$ 010	54 08	54 17
	001 $\wedge$ 112	34 46	34 54
	121 $\wedge$ 121	85 59	86 00

* Min. Russl. vi. pp. 106, 1870. Also Atlas Taf. lxxx, figs. 20 and 20 bis.

2. *Hematite and Cassiterite*.—Interesting specimens of hematite and cassiterite intimately associated and crystallized have been forwarded by Prof. F. A. Genth for crystallographic examination. The place from which they come is Mina del Diablo, Durango, Mexico. Among them a number of undoubted pseudomorphs of cassiterite after hematite were observed. They are too small and lusterless for the forms to be determined, but the whole grouping is precisely the same as that of hematite in the familiar "Eisenrose" habit, consisting of radiating plates. Often the central portion of these plates consists of a piece of hematite, the outer surrounding part of tin oxide. There were also seen pseudomorphs of cassiterite after some octahedral mineral, probably magnetite.

These occurrences of cassiterite and hematite have already been described by Genth and vom Rath,* but in these specimens lately examined an additional point of interest was noted. This is the presence of cellular crystals of hematite filled with cassiterite. One of these is shown in fig. 4. The forms present on this crystal are

c , 0001, O ; a , $11\bar{2}0$, i -2; r , $10\bar{1}1$, R ; η , $01\bar{1}1$, -1; s , $02\bar{2}1$, -2; n , $22\bar{4}3$, $\frac{1}{3}$ -2; d , $10\bar{1}2$, $\frac{1}{2}$; Θ , $20\bar{2}1$, 2.

Those chiefly developed are the prisms and the basal pinacoids which give the crystals its habit. In reality these faces are present to a considerable degree only along the edges, the remaining parts being sunken and filled with a roughened surface of cassiterite which runs on through the crystal. The polish and luster of as much of the face as is present is, however, very fine and brilliant.

A thin section of this individual was prepared parallel to the unit prism to ascertain if the cassiterite had here also any definite orientation in regard to the hematite. None was observed. The two minerals, both appearing fresh and unaltered, were present in irregularly mingled masses. The cassiterite was formed of an intimate crystal aggregation as shown by its slight but uniform action on polarized light.

From these facts it would seem as if the two minerals had been formed simultaneously and the hematite having a greater tendency to crystallize than the cassiterite had assumed its crystal boundaries without regard to the latter.

3. *Gypsum*.—The crystals which are illustrated in fig. 5 are from Girgenti, in Sicily, and are now in the cabinet of Prof. Geo. J. Brush. They are twinned according to the usual method,

* Proceedings Am. Phil. Soc., 1887, xxiv, 23.

the twinning axis a normal to 100 and the following simple forms are present, m , I , 110; b , i , 010; l , -1 , 111; and e , $\frac{1}{3}i$, $\bar{1}03$. Since the orthodome $\frac{1}{3}i$, lacks only about two degrees of forming a right angle with the orthopinacoid, the two domes in twin position practically present the appearance of a basal plane and the whole crystal that of hemimorphic orthorhombic rather than of mon-

oclinic symmetry. This pseudo-basal plane is rough and oscillatory and the very slight salient angle cannot be detected. The crystals are of good size and very symmetrical except at the end where the twin pyramids are; they are attached by this point and are as a consequence broken and disturbed at this place.

4. *Pennine*.—The crystal form and optical properties of the violet chrome pennine or künmererite from Texas, Penn., were originally described by Cooke* from specimens from the cabinet of Prof. Brush. At the request of Prof. E. S. Dana I have recently studied the suite of specimens in Prof. Brush's collection from this locality and thanks to the present perfection of apparatus for crystallographic investigation, I have been able to make out several forms observed by Prof. Cooke but which he was not then able to determine. The forms observed on these crystals are as follows:

O, 0001; R, $10\bar{1}1$; y , $\frac{2}{3}$, $20\bar{2}5$; ϕ , $\frac{4}{3}$, $4\cdot0\cdot\bar{4}13$; z , $\frac{1}{3}$, $10\bar{1}3$; ρ , $\frac{1}{2}$, $11\bar{2}4$; χ , $1\cdot2$, $11\bar{2}2$.

The last three are new. The habit is shown in figs. 6 and 7. Fig. 6 is very similar to that given by Cooke, omitting the pyramids of the second order. As observed by him the crystals are generally twins. The planes forming the re-entrant angle are nearly always more or less striated, moreover this re-entrant angle is, so far as observed, invariably formed by the unit rhombohedron R ($10\bar{1}1$). Fig. 7 shows a case where there was practically no striation and the angle could be measured. The presence of pyramids of the second order is a noteworthy characteristic, on no crystal out of a large number was it ever wanting. With one or two exceptions, on very small crystals, they were invariably striated as shown in fig. 7. These striations all lie in one zone, and this having been determined, it was possible to measure from the base along this zone, the reflections of various pyramids which stood out in the band of light connecting them.

In this way the presence of $\frac{1}{3}2$ ($11\bar{2}6$), $\frac{1}{5}2$ ($22\bar{4}5$), $\frac{9}{10}2$ ($9\cdot9\cdot\bar{1}8\cdot20$) and $\frac{7}{4}2$ ($7\cdot7\cdot\bar{1}4\cdot8$) was determined by moderately

* This Journal, vol. xlv, pp. 201, 1867.

good measurements, some of which were repeated on several crystals.

The following table shows the identification of the forms by calculated and measured angles. For the calculated the elements of Cooke are taken, in which

$$a : c = 1 : 3.4951. \quad c \wedge R (0001 \wedge 10\bar{1}1) = 76^\circ 05'.$$

	Forms.	Calc.	Meas.
$c \wedge r$	$0001 \wedge 10\bar{1}\bar{1}$	$103^\circ 55'$	104°
$c \wedge \phi$	$0001 \wedge 4 \cdot 0 \cdot 4 \cdot 13$	$51 \quad 09$	$51^\circ 06'$
$c \wedge y$	$0001 \wedge 20\bar{2}5$	$58 \quad 13$	$58 \quad 05$
$c \wedge z$	$0001 \wedge 10\bar{1}3$	$53 \quad 22\frac{1}{2}$	$53 \quad 48$
$c \wedge \rho$	$0001 \wedge 11\bar{2}4$	$60 \quad 13\frac{1}{2}$	$60 \quad 35$
$z \wedge \rho$	$10\bar{1}3 \wedge 11\bar{2}4$	$25 \quad 54$	$25 \quad 22$
$c \wedge \chi$	$0001 \wedge 11\bar{2}2$	$74 \quad 05$	$74 \quad 10$

The form 1-2 ($11\bar{2}2$) was also identified by the fact that it lies in the zone between $\frac{1}{3}$ ($10\bar{1}3$) and r , R , ($10\bar{1}\bar{1}$).

5. *Mordenite*.—The author desires to correct a small error which crept into the determination of the constants of this mineral as given in this Journal, xl, page 236. These should read

$$a : \bar{b} : c :: 0.40099 : 1 : 0.42792 \text{ angle } \beta = 88^\circ 29' 46''$$

instead of the figures there given, which are

$$a : \bar{b} : c :: 0.40101 : 1 : 0.42623 \text{ angle } \beta = 88^\circ 30' 30''.$$

Mineralogical Laboratory, Sheffield Scientific School,
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