Mineralogical Notes.

Polybasite; Aikinite; Quartz; Cuprite; The Locality of Turnerite.

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Polybasite.

THIS mineral occurs in thin hexagonal plates with bevilled edges, which were formerly referred to the rhombohedral system, on account of their characteristic triangular striations, which run parallel to alternate edges of the hexagon.

Des Cloizeaux in 1867 (*Nouvelles Recherches*, p. 85) found the crystals from Freiberg, which are sometimes sufficiently thin to transmit light, to be biaxal, the acute bisectrix being perpendicular to the surface of the plates; the apparent angle between the axes could not be determined accurately, but was found to vary from 63° to 88°. The mineral must consequently be regarded as orthorhombic, with a prism angle very near to 60°. The only crystallographic measurements which have been published relating to polybasite are those of Breithaupt, who found the minute planes which bevil the edges of the plates to be inclined at 58°30′ to the basal plane (*Vollständige Charakteristik des Mineralsystems*, 1832, p. 266); in accordance with this measurement the mineral has always been referred to a rhombic pyramid, having the angles 50°28′ and 95°12′.

An accurate determination of the form is difficult, both on account of the small size of the pyramid faces, and because the crystals are almost invariably composed of a number of triangular or hexagonal plates piled together in nearly parallel positions.

The following elements are deduced from the best measurements obtainable on 15 crystals from Andreasberg, Freiberg, Przibram, Guanaxuato and Caldera (Chili), and may be regarded as correct to a close degree of approximation; it will be seen that they do not agree in the least with the measurements of Breithaupt.

System orthorhombic.

$$a : b : c = 1{\cdot}7262 : 1 : 0{\cdot}6344$$

$100 : 110 = 59°55'$; $010 : 011 : = 57°36\frac{1}{2}'$; $001 : 101 = 42°24'$

Forms observed.

c	001	0P	*w*	109	$\frac{1}{9}\breve{P}\infty$
m	110	∞P	*p*	111	P
n	101	$\breve{P}\infty$	*s*	221	2 P
t	201	$2\breve{P}\infty$	*r*	112	$\frac{1}{2}$ P

	Observed.	Calculated.	No. of Edges.	Limits.
	° ′			° ′ ° ′
cp	61·14		8	61·5 – 61·24
mm	60·10		1	
cn } *cr* }	41·57	{42·24 / 42·19½}	23	40·48 – 42·30
ct	61·14	61·18	3	61·8 – 61·17
cs	74·53	74·39	6	73·55 – 75·50
cw	5·40	5·48	1	

The prism angle *mm* could only be determined with accuracy by one direct measurement; but the angles between three consecutive pyramid zones were found by the cross measurements, $rn = 52°8'$, $pt = 71°46'$, to be 60°10′ and 60°11′ respectively, upon one very good crystal from Caldera, which yielded the following angles in the same zones:—

$cp = 61°14'$	$cs = 74°8'$
$cr = 42°12'$	$cm = 90°17'$

It is not possible to distinguish between the faces *n* and *r*, nor with certainty between *p* and *t*, since the three vertical zones formed by the base with the bevilling planes are nearly identical.

It is almost certain, however, that the only faces perpendicular to the base are those of the prism {110}, and that *s* is invariably associated with these, whereas the brachydiagonal zone *c n t* does not contain faces of the brachypinakoid {100}.

Those crystals (by no means rare) which apparently possess six faces belonging to a hexagonal prism, are to be explained by the overlapping of plates in twin position, the twin plane being (110).

That polybasite is twinned according to this law is proved by the optical character of the flakes from Caldera, which do not become dark in any position between crossed nicols, and rarely give a definite interference figure; the optic axes when discernible lie in planes inclined to one another at 60° in various parts of the same plate, proving that there is both a juxtaposition and an overlapping of twinned plates. The plane

of the optic axes is, as was stated by Des Cloizeaux, the macropinakoid (010).

NOTE.—In the Manuscript Catalogue of the Allan-Greg Collection, which now forms part of that of the British Museum, Haidinger gives 61° and 42° as the inclinations of the two faces to the basal plane, and the above table shows that these angles are nearly correct.

Aikinite.

The only measurement previously recorded for Aikinite (Patrinite, Nadelerz), is a prism angle of 70° given by Hörnes in *Haidinger's Berichte*, ii. (1847) p. 249.

The needles which are embedded in quartz and have no terminations are very difficult of measurement on account of their ribbed and striated character, and also because it is not easy to extract them from the quartz without fracture.

The examination of 18 crystals from Beresovsk has led to the conclusion that they are orthorhombic, and that the prism angle is 88°22′.

Calling this prism {110}, the measurements indicated further the presence of the prisms {310}, {210}, {140}, among the striated faces; the corresponding angles being—

	Observed.	Calculated.
100 : 310	19°·4	18°·56
100 : 210	26·34	27·13
100 : 140	63·26	62·47

These observations (which are merely approximate) were made partly upon crystal fragments and partly upon the impressions of needles in the quartz, which have a much brighter surface than the needles themselves.

The prism angle of Bournonite, which has a similar composition, is 86°20′, but it is impossible to say whether, if the two substances are isomorphous, the prism of Aikinite is to be compared with the prism 86°20′, or the macrodome 87°26′, or the brachydome 83°46′ of Bournonite.

Quartz.

A crystal of quartz occurring with apatite, orthoclase, lepidolite and gilbertite from Cornwall, which was kindly lent to me for measurement by Mr. Semmons carries a small face, having the indices $(22 . 5 . \bar{1}1)$, which is one of the rare faces of this mineral, having been only recorded previously by vom Rath, on a crystal from North Carolina, U.S.A.

The crystal is a combination of the forms—

b	$\{2\bar{1}\bar{1}\}$	∞R	
r	$\{100\}$	R	
z	$\{22\bar{1}\}$	$-R$	
s	$\{41\bar{2}\}$	$2P2$	
x	$\{4\bar{1}\bar{2}\}$	$4R\frac{8}{2} = 6P\frac{8}{5}$	
x_1	$\{22 . 5 . \bar{1}\bar{1}\}$	$\frac{7}{2}R\frac{11}{7} = \frac{11}{2}P^{11}$	

and is left-handed.

x_1 is a smooth but small face, replacing the edge between the characteristic rhombic face s and the trapezohedral face x, which generally serve to indicate the right- or left-handed character of a quartz crystal.

	Observed.	Calculated.
zr	46°·14′	46°·16′
zr	28·54	28·54
zx_1	53·41	53·41½
zx	54·50	54·51

The crystal described by vom Rath (*Zeits. f. Kryst* xii. 454) was also left-handed, and had x_1 replacing the edge between the prism and the face u $\{8\bar{1}\bar{4}\}$ $4P\frac{4}{3}$.

Cuprite.

A crystal from Wheal Phœnix, presenting a combination of the forms {111} {100} {211} {110} was found to have two faces (533) and (322) between the octahedron and the icositetrahedron (211); of these (533) has not been recorded before. The face is smooth, but slightly curved in the zone [211 : 111].

	Observed.	Calculated.
211 : 533	5°·24′	5°·2′
211 : 322	8·2	8.3

The Locality of Turnerite.

The locality of the Turnerite from Dauphiné, which was first described by Lévy, in the *Annals of Philosophy*, Vol. XXI. March 3rd, 1823, p. 241, is stated in all the text books to be Mont Sorel.

Lévy himself only speaks of the mineral as occurring "with adularia and lamellary crichtonite from Dauphiny." But the same substance was more completely described by W. Phillips two months later (May 10th, 1823) in his *Elementary Introduction to Mineralogy*, Third Edition, p. 382, where he says, with regard to this locality:—"It has been found only on Mont Sorel, in Dauphiné, accompanying quartz, lamellary crichtonite, and the octahedrite."

It appears that all subsequent writers have taken the locality from this statement of Phillips.

Three years ago, however, Mr. Seligmann, of Coblenz, informed me that in a tour through Dauphiné, which he made in company with Prof. Groth in the year 1882, no trace of a mountain bearing this name could be found; and he asked me if I knew from what source Phillips had derived his information regarding the locality.

The results of Groth and Seligmann's tour through Dauphiné are to be found in a paper by the former, entitled "Die Minerallagerstätten des Dauphiné," in the *Sitzungsber. der Königl. bayer. Akad. der Wissenschaften zu München*, xv. (1885) p. 371.

From that description there appears to be no doubt that the true locality of the Turnerite to be found in most mineral collections is Le Puys, near St. Christophe, where it occurs associated with albite, quartz, chlorite, dolomite, crichtonite, pyrites, sphene, brookite and anatase; it is also found with albite, quartz, anatase, calcite, pyrites, and chlorite at the neighbouring locality of le Fremey in the Romanche Valley.

As the possible origin of Mont Sorel, Groth is only able to refer to the Alp Sarrel, which is close to Maronne. The only other mineral, apparently, which is recorded from Mont Sorel in Dauphiné is the Epidote mentioned by Bücking (*Zeitschr. f. Kryst.* Vol. II. p. 401).

In order that the existence of this fabulous mountain may be completely disproved, it becomes necessary to discover how Phillips obtained the locality of his specimen.

Lévy mentions that at the time when he was writing, the new mineral was very scarce, and "besides the specimen where I have observed it Mr. Heuland knows but one more, in England." Phillips, however, writing two months later, says that it has been "heretofore considered a variety of sphene," and "has occasionally been brought into this country under the name of Pictite."

The last sentence proves to be the key to the mystery. Pictite was the name given by Delamétherie (*Leçons de Minéralogie*, i. (1812) p. 331) to certain crystals found by Prof. Pictet at Chamounix. Now similar crystals from Binden were the subject of a memoir by F. Soret, of Geneva (in the year immediately preceding the discovery of Turnerite), in which the author advances reasons for regarding Pictite as a distinct species. This mineral has been subsequently recognised as identical with sphene.

It appears, from what Phillips says, that Turnerite was at first supposed to be Pictite; what then can be more natural than that Mont Sorel is in some way a corruption of Mons. Soret?

It is possible, for instance, that specimens of the newly found mineral from Dauphiné being regarded as identical with the Pictite recently described by Soret were labelled

Pictite de Mons. Soret,
Dauphiné,

and that such a label was read erroneously, or copied as

Pictite de Mont Sorel,
Dauphiné.

The next step, then, is to trace the specimen described by Phillips, and see whether there is any indication of such an error.

Now Phillips' collection was sold in 1829 to Dr. Rutter, of Liverpool, and in the "Catalogue of a Cabinet of Minerals, the property of the late W. Phillips, now to be disposed of by private contract," 1829, p. 44, the following entry is to be found:—

"Pictite with blue anatase, chloritous quartz and adularia, Mont Soret, Dauphiny."

If, then, this entry is correctly reprinted from the label of the specimen, the spelling of the word Soret supplies the indication which we seek; it only remains to compare the entry with the original label.

The collection was bequeathed by Dr. Rutter to the Medical Institution of Liverpool, whence it was transferred in 1877 to the Liverpool Museum; I accordingly wrote to Mr. T. J. Moore, the Curator, who at once caused search to be made, and found both the specimen and the written label, and through his kindness I was enabled to see the latter, and make sure that the locality is there written as "Mt. Soret."

There can be little doubt then that the mountain does not exist, and that it was introduced by a clerical error into mineralogical literature in which it has enjoyed a fictitious existence for the last 60 years.