On the relation between Rathite, Rathite a, and Wiltshireite.

By R. H. Solly, M.A.

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AT the Society's Anniversary Meeting of November, 1903, I exhibited and gave an account of an unnamed crystal from the dolomite of the Lengenbach quarry in the Binnenthal, Switzerland. In the notice of this meeting, as given in 'Nature' of December 10, 1903 (vol. lxix, p. 142), this mineral, which could not be identified with any of the sulpharsenites of lead previously described, is referred to as follows:— 'One of these [black minerals with metallic lustre] is oblique with $\beta = 81° 11'$, (100),(101) = 40° 7', (010),(111) = 55° 26'; it has a perfect cleavage (100), and, like liveingite, exhibits no oblique striations on the planes in the zone [100,001].'[1] Owing to lack of material, the chemical composition and specific gravity of this apparently new mineral could not be determined. Later, in a list of unnamed minerals, which I supplied to Mr. L. Desbuissons for incorporation in his book 'La Vallée de Binn' (Lausanne, 1909, p. 65), the mineral in question is referred to as: 'Cristaux gris de plomb obliques (Rathite a)—$\beta = 81° 11'$—pas de stries de macles (*Nature*, 1903).' I suggested the term rathite a on account of the close similarity of the interfacial angles, habit, cleavage, and streak to those of rathite.

These observations escaped the notice of Professor Lewis; and the crystal, also from the Lengenbach quarry, described by him in 1910 under the name wiltshireite[2] is clearly the same substance as that examined by me in 1903. He makes no mention of the close relation which exists between the angles of his crystal and those of rathite.

Since 1903 I have thought that rathite is, like dufrenoysite,[3] oblique and not rhombic; but I have postponed publishing anything on this

[1] [100,001] is a misprint for [100,010]—the prism-zone.

[2] W. J. Lewis, 'Wiltshireite: a new mineral,' Nature, 1910, vol. lxxxiv, p. 203; Phil. Mag., 1910, ser. 6, vol. xx, pp. 474–475; Zeits. Kryst. Min., 1910, vol. xlviii, pp. 514–515.

[3] R. H. Solly, Mineralogical Magazine, 1902, vol. xiii, p. 160.

group of minerals in the hope that I should be able to obtain good oblique crystals for chemical analysis.

The following table of calculated angles shows the remarkably close relation which exists between rathite, rathite *a*, and wiltshireite:—

Rathite.[1]	Rathite *a*.[2]	Wiltshireite.[3]
(010) : (140) = 27° 36′	(100) : (210) = 27° 26′	(100) : (310) = 27° 27′
: (120) = 46 16½	: (110) = 46 4½	: (320) = 46 6
: (320) = 72 19	: (130) = 72 12	: $(\bar{1}20)$ = 72 13
(010) : (3.11.3) = 37° 59½′	(100) : $(21\bar{1})$ = 37 21½	(100) : (522) = 37 33
	: (533) = 38 1	: $(31\bar{1})$ = 38 4½
: (131) = 43° 40′	: $(53\bar{3})$ = 43 8	: (211) = 43 9
	: (433) = 43 45½	: $(52\bar{2})$ = 43 58
: (373) = 50 49½	: $(43\bar{3})$ = 50 13	: (322) = 50 14
	: (111) = 51 0	: $(21\bar{1})$ = 51 4
: (353) = 59 48	: $(11\bar{1})$ = 59 7	: (111) = 59 7
	: (233) = 60 5½	: $(32\bar{2})$ = 60 10½
: (111) = 70 45	: $(23\bar{3})$ = 70 1½	: (122) = 70 1
	: (133) = 71 12	: $(11\bar{1})$ = 71 16
: (313) = 83 21½	: $(13\bar{3})$ = 82 40	: (011) = 82 37½
	: (011) = 83 57½	: $(12\bar{2})$ = 83 58
(010) : (031) = 33 6½	(100) : $(50\bar{3})$ = 32 35½	(100) : (201) = 32 38
	: (403) = 33 9½	: $(50\bar{2})$ = 33 14
: (073) = 39 59[4]	: $(40\bar{3})$ = 39 20	: (302) = 39 22
	: (101) = 40 7	: $(20\bar{1})$ = 40 12½
: (053) = 49 34	: $(10\bar{1})$ = 48 46	: (101) = 48 47
	: (203) = 49 52½	: $(30\bar{2})$ = 49 58½
: (011) = 62 55½	: $(20\bar{3})$ = 61 58½	: (305) = 61 57½
	: (103) = 63 29	: $(10\bar{1})$ = 63 35½
: (013) = 80 20	: $(10\bar{3})$ = 79 18½	: (001) = 79 16
	: (001) = 81 11	: $(10\bar{2})$ = 81 16

To sum up:—

(1) Rathite, rathite *a*, and wiltshireite all crystallize with a striated prism-zone, well-marked dome-faces, and a zone of small pyramid-faces. A face perpendicular to the prism-zone is absent.

(2) They all possess a perfect cleavage parallel to the pinacoid to which in rathite *a* and wiltshireite the symbol (100) has been assigned; in rathite this is Baumhauer's (001) and my (010).

[1] R. H. Solly, Mineralogical Magazine, 1901, vol. xiii, p. 79.

[2] R. H. Solly, calculated from the angular elements given in 1903 (loc. cit.).

[3] W. J. Lewis, loc. cit. Professor Lewis does not give the angles of the prism-zone, but states that he has observed the presence of these three prism-faces.

[4] This is near to H. Baumhauer's measured angle (001) : (045) = 40° 14½′ for rathite (Zeits. Kryst. Min., 1896, vol. xxvi, p. 595).

(3) The streak of each mineral is chocolate-coloured.

(4) In the prism-zone [100,010] the angles between corresponding planes differ but slightly—the variation not exceeding 11′.

(5) In the second zone in the above table there is a similarity in the grouping of the faces, with angles differing by only 5′—36′.

(6) In the third zone the rathite angles 33° 6½′ and 40° 14½′ (measured by Baumhauer) are practically identical with the wiltshireite angles 33° 14′ and 40° 12½′.

(7) Professor Lewis describes his crystal as a simple one, but from his measured angles (100) : (522) and (100) : (302) it may be suggested that the crystal is twinned with (100) as twin-plane and face of union, since this twinning is common in the oblique rathites. His planes (522) and (302) would then be equivalent to $(31\bar{1})$ and $(20\bar{1})$ respectively, as shown below:—

	Calculated.	Measured (Lewis).
(100) : (522)	37° 33′	38° 7′
: $(31\bar{1})$	38 4½	—
(100) : (302)	39 22	40 11
: $(20\bar{1})$	40 12½	

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