A new mineral, isomorphous with trechmannite, from the Binn valley, Switzerland.

By R. H. Solly, M.A.

[Read March 21, 1911.]

In August 1904 I discovered in the Lengenbach quarry a specimen on which were three small, round-shaped crystals, about the size of small shot, grown upon a prismatic crystal of sartorite. I measured them, and owing to their small size experienced some difficulty in determining the position of some of the faces with the goniometer at my disposal, which was of the ordinary single-circle pattern. In the course of the short account of the history of the Lengenbach quarry which I gave at the meeting of the Mineralogical Society held on November 13, 1906, I briefly described these crystals, and a note based on information supplied by me was inserted by Desbuissons in his book.[1] I waited in the hope that further crystals might be discovered in subsequent years so as to permit of a chemical analysis of the mineral, but none was found, and I finally decided to place on record the result of my observations.

Just as in the case of trechmannite these crystals belong to the diplohedral-rhombohedral type of symmetry, and the fundamental angle $(111 : 100) = (0001 : 01\bar{1}1)$, is 38° 18′, as compared with 37° 1′ for the corresponding angle of trechmannite. The new crystals possess a cleavage parallel to the basal plane $(111) = (0001)$, and most probably another parallel to the faces of the primitive rhombohedron $(100) = (01\bar{1}1)$; trechmannite exhibits a good cleavage parallel to the latter faces, and one less conspicuous parallel to the basal plane. Just as with trechmannite the faces of the forms $(100) = (01\bar{1}1)$ and $(\bar{1}01) = (1\bar{2}10)$ are well developed. The parallel hemihedrism is well shown in the zones $[010 : 001] = [10\bar{1}1 : \bar{1}101]$ and $[\bar{1}10 : 001] = [1\bar{1}20 : \bar{1}101]$. The

[1] L. Desbuissons, 'La Vallée de Binn (Valais),' Lausanne, 1909, p. 66: '5° Cristaux gris de plomb rhomboédriques. 111 : 100 = 38° 18′. Très petits et très modifiés.'

prism-zone is irregularly developed, many of the faces being absent, and this irregularity coupled with the parallel hemihedrism disguises the nature of the symmetry.

Altogether twenty-one forms were observed as under, of which all except the last six have been found on trechmannite:—c (111) = (0001), m ($\bar{2}11$) = (01$\bar{1}$0), $F\,\pi$ ($\bar{3}21$) = (14$\bar{5}$0), $d\,\pi$ (725) = (14$\bar{3}$0), a (I01) = (1$\bar{2}$10), H (122) = (0$\bar{1}$15), e (011) = (01$\bar{1}$2), s ($\bar{1}$11) = (02$\bar{2}$1), r (100) = (0$\bar{1}$11), $a\,\pi$ (3$\bar{1}\bar{1}$) = (04$\bar{4}$1), $x\,\pi$ ($\bar{2}$12) = (14$\bar{3}$1), $V\,\pi$ ($\bar{5}$31) = (26$\bar{8}$1), $b\,\pi$ (2$\bar{1}$0) = (12$\bar{3}$1), $z\,\pi$ (313) = (26$\bar{4}$1), $p\,\pi$ (012) = (1$\bar{2}$13), $I\,\pi$ (776) = (1.13.$\bar{1}\bar{4}$.6), $P\,\pi$ ($\bar{3}$50) = (53$\bar{8}$2), $K\,\pi$ (I30) = (31$\bar{4}$2), L ($\bar{1}$40) = (41$\bar{5}$3), $M\,\pi$ ($\bar{1}$70) = (71$\bar{8}$6), $N\,\pi$ ($\bar{3}$32) = (15$\bar{6}$2). There were also present some tiny faces, lying outside the measured zones, which were too minute for measurement on the goniometer. The observations are tabulated below.

Trechmannite, which is scarlet-vermilion in colour and has a streak of the same colour, contains sulphur, arsenic, and silver; the new mineral, on the other hand, is lead-grey in colour, and gives a chocolate-coloured streak, and probably therefore contains sulphur, arsenic, and lead. Since the two minerals are isomorphous, the new one may conveniently be termed trechmannite-α.

Measurements from ($\bar{1}$10) = (11$\bar{2}$0) in the zone with (110) = (1$\bar{1}$02):—

Form.	Calculated Values.	Measured Angles.
($\bar{3}$50) = ($\bar{5}\bar{3}\bar{8}$2)	21° 28′	21° 33′
($\bar{1}$20) = (21$\bar{3}$1)	27 40	27 40, 27° 41′, 27° 44′
($\bar{1}$30) = (31$\bar{4}$2)	38 11	38 17, 38 28
($\bar{1}$40) = (41$\bar{5}$3)	44 9	44 9
($\bar{1}$70) = (71$\bar{8}$6)	49 3	50 14
(010) = (10$\bar{1}$1)	57 33	57 10, 57 33, 57 33, 57° 33′, 57° 37′
(120) = (2$\bar{1}$$\bar{3}$)	78 2	76 30
(110) = (1$\bar{1}$02)	90 0	90 0
(210) = (1$\bar{2}$$\bar{3}$)	101 58	100 36
(100) = (0$\bar{1}$11)	122 27	122 22, 122 37
(4$\bar{1}$0) = ($\bar{1}\bar{4}\bar{5}$3)	136 39½	136 36
(3$\bar{1}$0) = ($\bar{1}\bar{3}$42)	141 49	142 5
(1$\bar{1}$0) = ($\bar{1}\bar{1}$20)	180 0	180 0
(1$\bar{2}$0) = ($\bar{2}$13$\bar{1}$)	207 40	207 41
(130) = (3$\bar{1}$42)	218 11	216 15
(0$\bar{1}$0) = (101$\bar{1}$)	237 38	237 29
($\bar{1}\bar{1}$0) = ($\bar{1}$102)	270 0	270 0, 270 7
(3$\bar{1}$0) = ($\bar{1}$32$\bar{4}$)	287 38	287 41, 288 0
($\bar{1}$00) = (01$\bar{1}\bar{1}$)	302 27	302 22, 302 27, 302 27
(4$\bar{1}$0) = (14$\bar{5}$3)	316 39½	316 27, 316 29
(310) = (13$\bar{4}$2)	321 49	322 15

Measurements from $(\bar{1}10) = (11\bar{2}0)$ in the zone with $(001) = (\bar{1}101)$:—

Form.	Calculated Values.	Measured Angles.
$(\bar{3}31) = (24\bar{6}1)$	17° 15½′	17° 57′
$(\bar{2}21) = (13\bar{4}1)$	24 59	24 56, 25° 3′
$(\bar{7}76) = (1.18.\bar{1}\bar{4}.6)$	38 37	38 40
$(\bar{1}11) = (02\bar{2}1)$	42 59	42 53, 42 54, 42° 55′, 42° 56′, 42° 57′, 43° 5′
$(\bar{1}12) = (\bar{1}32\bar{2})$	61 17	61 12, 61 36
$(001) = (\bar{1}101)$	90 0	89 52, 90 0, 90 0
$(1\bar{1}1) = (\bar{2}021)$	137 1	137 36
$(2\bar{2}1) = (3\bar{1}41)$	155 1	154 59
$(1\bar{1}0) = (\bar{1}\bar{1}20)$	180 0	180 0
$(\bar{1}12) = (3\bar{1}\bar{2}2)$	298 43	298 16, 298 16
$(\bar{1}1\bar{1}) = (20\bar{2}\bar{1})$	317 1	316 56, 317 4, 317 8
$(\bar{3}32) = (51\bar{6}\bar{2})$	328 9	328 12
$(\bar{2}2\bar{1}) = (31\bar{4}\bar{1})$	335 1	335 59
$(\bar{3}3\bar{1}) = (42\bar{6}\bar{1})$	342 44½	342 12, 344 56

Measurements from $(\bar{1}10) = (11\bar{2}0)$ in the zone with $(11\bar{1}) = (\bar{2}\bar{2}01)$:—

Form.	Calculated Values.	Measured Angles.
$(\bar{1}3\bar{1}) = (40\bar{4}1)$	34° 21′	34° 8′, 34° 9′
$(02\bar{1}) = (3\bar{1}\bar{2}1)$	53 49	53 35, 53 35
$(11\bar{1}) = (\bar{2}\bar{2}01)$	90 0	89 48

Measurements from $(\bar{1}10) = (11\bar{2}0)$ in the prism-zone:—

Form.	Calculated Values.	Measured Angles.
$(\bar{2}3\bar{1}) = (41\bar{5}0)$	21° 47′	22° 33′
$(\bar{1}2\bar{1}) = (10\bar{1}0)$	30 0	31 9
$(01\bar{1}) = (2\bar{1}\bar{1}0)$	60 0	59 57, 60° 3′
$(123) = (5\bar{4}\bar{1}0)$	81 47	81 47
$(25\bar{7}) = (43\bar{1}0)$	87 48	87 54
$(11\bar{2}) = (1\bar{1}00)$	120 0	120 5, 120 55
$(110) = (\bar{1}\bar{1}20)$	180 0	179 52
$(0\bar{1}1) = (\bar{2}110)$	240 0	240 56
$(\bar{1}01) = (\bar{1}2\bar{1}0)$	300 0	300 1

Measurements from $(\bar{1}10) = (11\bar{2}0)$ in the zone with $(111) = (0001)$:—

Form.	Calculated Values.	Measured Angles.
$(\bar{3}51) = (44\bar{8}3)$	28° 45′	28° 4′
$(\bar{1}31) = (22\bar{4}3)$	47 39	46 58
$(201) = (\bar{1}\bar{1}23)$	114 80	114 55
$(3\bar{1}1) = (22\bar{4}3)$	132 21	132 53

Measurements from $(\bar{1}2\bar{1}) = (10\bar{1}0)$ in the zone with $(111) = (0001)$:—

Form.	Calculated Values.	Measured Angles.
$(010) = (10\bar{1}1)$	51° 42′	51° 29′, 51° 55′
$(111) = (0001)$	90 0	89 37, 90 1
$(101) = (\bar{1}012)$	111 32	111 32, 111 32