XXXI.—*Crystallographical Characters of Aconitine from* Aconitum napellus.

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The crystals of aconitine obtained during the course of the work described in the preceding communication were frequently of considerable size, and generally well developed. The specimens examined were transparent prisms, terminated by pyramids. They were of a faint yellowish colour, with a brilliant lustre, and varied in size from very small to prisms a centimetre long, and half a centimetre thick. One of the prism faces was sometimes so much better developed than the others as to give the crystals an elongated tabular appearance. Excellent reflections, as a rule, were obtained, but occasionally the images were distorted by a slight curvature of the faces.

Eight crystals were measured as completely as their development would permit.

System: Rhombic. Habit: Prismatic with an inclination to tabular, owing to large development of the brachypinacoid.

Ratio of axes: $a : b : c = 0{\cdot}5456 : 1 : 0{\cdot}3885$.

Forms observed: $a = \{100\}\infty\breve{P}\infty$; $b = \{010\}\infty\breve{P}\infty$;
$p = \{110\}\infty P$ $p' = \{120\}\infty\breve{P}2$;
$m = \{101\}\breve{P}\infty$; $q = \{021\}2\breve{P}\infty$;
$o = \{121\}2\breve{P}2$.

The general appearance of the crystals is shown in Fig. 1, and their spherical projection in Fig. 2.

Fig. 1.

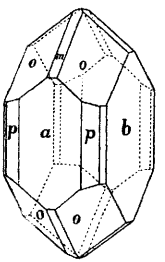
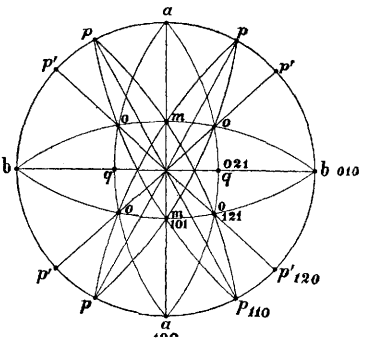


Fig. 2.



The brachypinacoid $b(010)$ is the best developed face. The orthopinacoid $a(100)$ is also generally well developed, but is almost invariably narrower than b. The primary prism faces $p(110)$ are always present, often as broad as the orthopinacoid, but occasionally mere lines. The prism $p'(120)$ was only once observed, and gave but a very faint image. Of the end faces, the pyramid $o(121)$ is always largely developed, and gives excellent reflections. The primary macrodome $m(101)$ is usually developed to about the extent shown in the drawing, but is sometimes narrower, and occasionally absent. The brachydome $q(021)$ was only once observed, and the image was then faint and distorted.

The following goniometrical measurements were made :—

Angle observed.	No. of measurements.	Limits.	Mean observed.	Calculated.
$bp = 010 : 110$	24	60° 43′ — 62° 21′	61° 16′	61° 23′
$pa = 110 : 100$	21	27 6 — 29 21	28 44	28 37
$bp' = 010 : 120$	1	—	42 53	42 30
$bo = 010 : 121$	44	56 36 — 58 23	57 42	*
$om = 121 : 101$	36	31 24 — 32 49	32 18	32 17
$am = 100 : 101$	16	54 10 — 54 50	54 27	54 33
$mm = 101 : \bar{1}01$	5	70 52 — 71 12	71 3	70 54
$ao = 100 : 121$	41	59 32 — 61 39	60 39	*
$oq = 121 : 021$	2	29 3 — 29 30	29 17	29 21
$oo = 121 : \bar{1}21$	18	57 40 — 59 24	58 35	58 42
$pm = 110 : 101$	31	58 41 — 60 18	59 20	59 23
$mo = 101 : \bar{1}\bar{2}1$	32	73 4 — 74 51	73 58	73 57
$op = \bar{1}\bar{2}1 : \bar{1}\bar{1}0$	36	46 4 — 47 14	46 37	46 40
$bq = 010 : 021$	1	—	51 40	52 10

The two most frequently measured angles bo and ao were taken as basis of the calculations. In the most perfectly developed crystals, the rhombic nature of the symmetry was very evident, the angles upon opposite sides of the symmetry planes being identical within a very few minutes. The optical properties, however, conclusively prove the truly orthorhombic character of the crystals.

There is a good cleavage parallel to the macropinacoid $a(100)$, the a axis being the direction of minimum cohesion.

The optic axial plane is the brachypinacoid $b(010)$. Through the macropinacoid $a(100)$ both axes are seen in convergent light, symmetrically placed with respect to the normal to the face, separated at their acute angle. The axis a is thus the first median line. The rings and lemniscates are best seen through sections parallel to a, about $1\frac{1}{2}$ mm. in thickness. For the purpose of measurement, three crystals with an a face well developed were chosen; they were cemented by the a face in the usual manner upon a thin glass plate,

and then carefully ground in oil until they had been reduced to the right thickness. This mode of preparing sections was found preferable to using cleavage plates, as the latter were always more or less distorted. A section perpendicular to the second median line was also cut, but the obtuse angle was not visible in oil.

Aconitine, as will be seen from the following measurements, is a somewhat highly dispersive substance. The hyperbolic brushes are deeply fringed with colour, and a considerable difference is observed between the positions of the axes for different rays of the spectrum.

The following values were obtained for the apparent acute optic axial angle in air 2E as the mean of a large number of measurements with the three distinct sections referred to :—

For lithium light	47°	0′
For sodium light.....	56	10
For thallium light	65	5

The dispersion between these limits is thus seen to be 18° 5′ of the nature $\rho < v$. The whole of the values obtained were very near the mean values above given. The sections employed gave the interference figures very clearly. The larger axial angle apparatus of Fuess was used in making the measurements.

The sign of double refraction, determined by means of a quarter undulation mica plate, is positive.

In an inaugural dissertation at Dorpat, in 1885, Jürgens briefly described some crystals of aconitine as belonging to the rhombic system, and exhibiting the faces of the macropinacoid, primary prism, and brachydome. No measurements, however, were given.