X. *On the Tetartohedral Development of a Crystal of Tourmaline.*

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[Read June 24th, 1884.]

IN working on the isomorphism of Tourmaline I have been struck by the very peculiar development of a fine crystal from Pierrepont, New York, now in the Cambridge Collection.

The crystal is doubly terminated, of a jet-black colour and splendid lustre. It weighs 814.83 grammes, and measures $1\frac{1}{5}$ inch by 1 inch by $\frac{1}{2}$ inch.

The forms present are $r\ \kappa\ \{100\}$, $\bar{r}\ \kappa\ \{\bar{1}00\}$, $s\ \kappa\ \{\bar{1}11\}$, $\bar{e}\ \kappa\ \{0\bar{1}\bar{1}\}$, $u\ \kappa\ \pi\ \{3\bar{2}0\}$, $b\ \kappa\ \{2\bar{1}\bar{1}\}$, $\bar{b}\ \kappa\ \{\bar{2}11\}$, and $a\ \{10\bar{1}\}$.

Fig. I. is a stereographic projection of the poles of the faces present.

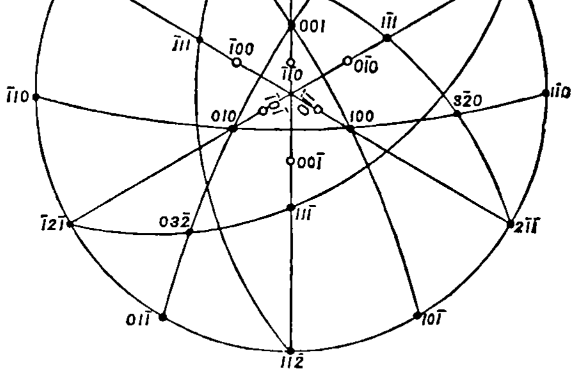

Fig. I.

Figures II. and III. are drawn so as to show in two positions the development of the faces.

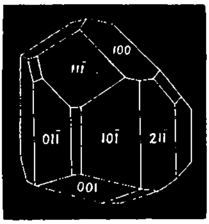

Fig. II.

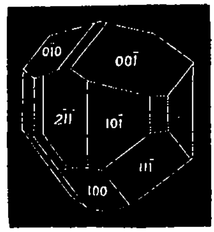

Fig. III.

The form *r* has all its faces present, but the parallel faces are thrice as large.

The form *s* is only present with the smaller *r* faces, and is entirely absent at the other end of the crystal (Fig. II.).

The form *e* is a narrow plane only present with the large *r* faces, and is entirely absent at the other end of the crystal (Fig. III.).

The form *b* has all its faces present, but its parallel faces are unequally developed.

So far the crystal is but a fine example of hemimorphic development, the parallel faces being wanting or very unequally developed.

But *u*, a scalenohedral form which ought to exhibit holohedrally twelve faces or hemihedrally six faces, appears with only three faces on this crystal, which are all at one extremity of the axis, and arranged in the manner of similar planes on apatite or quartz.

The question then arises: are the three faces which are thus alone found a true tetartohedral development of a scalenohedron; and are we to deduce it from the law of apatite or the law of quartz, since, geometrically, on account of the hemimorphic development, it may belong to either?

Though such tetartohedrism is not known to occur on any native mineral, it has been observed on the crystals of an artificial salt.

Groth has described (*Pogg.* 137, 436) crystals of sodium super-iodate $(Na\,I)\,O_4+3$ aq. which exhibit tetartohedrism.

But, since these crystals rotate the plane of polarisation, Groth considers them as examples of a hemimorphic development of an asymmetric hemihedral crystal, like quartz.

As crystals of tourmaline do not rotate the plane of polarisation, it is probable that in the case of the present crystal the hemimorphic development is of a semiform, similar to those which have been observed on dioptase and apatite, and that the form should be designated crystallographically as $u\ \kappa\ \pi\ \{8\bar{2}0\}$.

Though it may be rash to accept a tetartohedral development of tourmaline from the observations of one crystal, still it must be remembered that scalenohedral forms are the only ones which render the observation possible, and that such forms are extremely rare ; and, moreover, that the presence of six planes of the scalenohedron at one end of the axis does not necessarily militate against such a view, unless it be shown that these planes are similar in their physical characters.

I have examined several crystals from Pierrepont in different collections; the planes u are fairly common in these crystals, but that of the Cambridge collection is the only one in which three planes of the form alone exist; generally it seems as if six planes occurred together at one end of the axis.

Perhaps the observation is sufficiently interesting to justify my calling the attention of crystallographers to it.

The crystal has been measured on a Fuess goniometer with the highest power, and good measurements were obtained, from which the following element was calculated :— $r\,o = 27^{\circ}36\frac{1}{2}'$.

		Found.	Calculated.
$s\,s_1$	=	$77^{\circ}29'$	$77^{\circ}30'$
$r\,r_1$	=	$47^{\circ}20\frac{1}{2}'$	$47^{\circ}20'$

The pyro-electric property has been tested, and it has been found that while cooling, the end on which the half form s appears is the antilogous pole, and the opposite end, on which the half form e appears, the analogous pole.

The specific gravity was found to be 3.145.