On the occurrence of Phenacite and Scheelite at Wheal Cock, St. Just, Cornwall.

By Arthur Russell.

[Read November 4, 1919.]

JAMES SOWERBY in his 'British Mineralogy'[1] describes and figures under the head of 'Argilla electrica' or 'White Tourmaline' a mineral which was undoubtedly phenacite. The specimen was sent to Sowerby by a Mr. Herbert[2] in 1804, and was said to have been found in a mine in St. Just, Cornwall. According to Sowerby's description and from the coloured plate which he gives of the specimen, the mineral occurred as long-prismatic, colourless crystals, some of which were doubly terminated

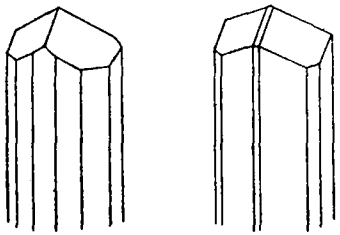

Fig. 1.—Phenacite ('White Tourmaline') crystals. After J. Sowerby, 1809.

and lying upon and partly penetrated by a mass of prismatic quartz crystals. The crystals were 'so divided by cracks and flaws in general as to appear of an opaque whiteness in parts'. Unfortunately, their

[1] J. Sowerby, British Mineralogy, 1809, vol. 4, plate 331, pp. 53-54. This work was issued in parts between 1802 and 1817; the title-page of vol. 4 bears the date 1811, whilst the plate referred to is dated 1809. It may here be mentioned that as a whole the plates in Sowerby's work are, considering the date at which they were executed, extremely true to nature and compare favourably with many of the much more recent attempts at pictorially depicting mineral specimens, while the text contains the record of many occurrences which were new to that period of mineralogical knowledge.

[2] In another part of Sowerby's work (vol. 4, p. 29) Mr. Herbert is referred to as 'a very ingenious collector, of Bristol'.

actual size is not stated, but of those shown in the plate, one measures 2¼ cm. in length, that is assuming the drawing is more or less to scale. In addition to the coloured drawing above described, two figures of crystals are given which are here reproduced (fig. 1); from these it would seem that the forms present were *a* {11$\bar{2}$0}, *m* {10$\bar{1}$0}, *r* {10$\bar{1}$1}, and *d* {01$\bar{1}$2}, and that the crystals therefore closely resemble those from the St. Day United Mines and Wheal Gorland, Gwennap, described by myself in a previous number of this magazine.[1]

Sowerby remarks on the unusual form and rarity of the mineral and states that he believed Mr. Herbert possessed but one similar specimen. For the present whereabouts of these I have searched in vain. The suggestion as to the mineral being white tourmaline was made to Sowerby by the Hon. Charles Greville. It is interesting to note that this mineral had been figured by Sowerby in 1809, that is, twenty-four years before phenacite was described as a new species by Nordenskiöld in 1888.

In 1911 I described the characters and mode of occurrence of phenacite at five distinct localities in Cornwall, and in the present notes I am now able to give an account of its occurrence at an additional locality.

Phenacite.

Stamps and Jowl Zawn, Wheal Cock, St. Just, Cornwall.

During the summer of 1914, in company with my friend Mr. Jehu Richards of Callington, I made a very careful examination of the area of cliff between Botallack and Levant mines, primarily with the view to rediscovering if possible the extremely rare mineral stokesite. Although the latter was not forthcoming I was rewarded by the finding of several interesting minerals, amongst which was one which has proved to be phenacite and which closely agrees in its characters and association with the mineral described by Sowerby as 'white tourmaline'.

The specimens were obtained from a single mass amongst some blocks of lode material lying in the very inaccessible rocky inlet known as Stamps and Jowl Zawn, at the foot of Roscommon Cliff, under Wheal Cock. An adit opens into the Zawn, but as the mine has long been abandoned, access to the spot could only be gained by descending some mining ladders which had a few years before been fixed to the lower face of the cliff in connexion with a furtive attempt to reopen the mine.

[1] A. Russell, On the occurrence of phenacite in Cornwall. Mineralogical Magazine, 1911, vol. 16, pp. 55-62.

The phenacite crystals occur either attached to yellowish, iron-stained prisms of quartz or are embedded in a loosely-coherent, scaly, brownish-green, partially-altered chlorite, while associated with them are pale wax-yellow, bipyramidal crystals of scheelite, and small, black, prismatic crystals of cassiterite (sparable-tin), and also a few minute crystals of orthoclase of adularia habit.

The crystals of phenacite are of long-prismatic habit, those embedded in the chlorite mostly being without terminations and often corroded towards their extremities. They are, moreover, characterized by numerous transverse flaws of a regular character which cause them to be exceedingly fragile at right angles to the prism-faces. Some of the crystals are in part nearly white and opaque, while others are coated with a thin film of oxide of iron which gives them a yellowish colour; the film is, however, removable by acid, leaving them perfectly colourless. Of the crystals attached to the quartz two are doubly terminated, and it was found possible in the case of one to measure satisfactorily the prism-zone and one end without detaching the crystal from the specimen. This crystal (fig. 2) measures 8 mm. along the vertical axis and shows the following forms: $a\{11\bar{2}0\}$, $m\{10\bar{1}0\}$ usually narrow, $r\{10\bar{1}1\}$, $d\{01\bar{1}2\}$, $p\{11\bar{2}3\}$ one narrow face only, $s_1\{3\bar{1}\bar{2}1\}$, $x_1\{\bar{1}322\}$ large. Another terminated crystal extracted from the chlorite was also measured, and exhibited the same forms with the exception of p; the faces were, however, considerably etched and afforded less good images. The crystals from this locality differ from those from South Phoenix mine and St. Agnes in that $x_1\{\bar{1}322\}$ is in combination with $s_1\{3\bar{1}\bar{2}1\}$.

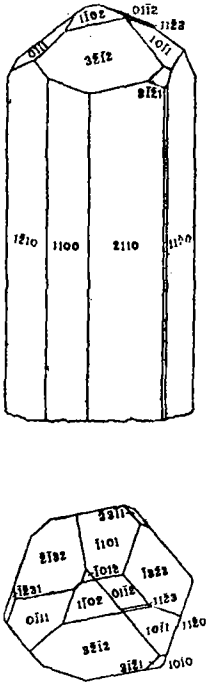

FIG. 2.—Phenacite crystal from Wheal Cock, St. Just, Cornwall.

Roscommon Cliff and the copper tin lodes of Wheal Cock are in greenstone and contact altered killas, not far from the granite.

SCHEELITE.

The crystals of scheelite occurring with the phenacite at Stamps and Jowl Zawn are the best examples of that mineral which have so far been met with in Cornwall, where it has always been a rare mineral. Amongst

other localities where it has been recorded is that of the neighbouring Levant mine.[1]

The scheelite crystals measure up to 1½ cm. along the vertical axis and are of simple bipyramidal habit, of the form $e\{101\}$, and in two examples show also the basal plane $c\{001\}$. In colour they are brownish-yellow to pale wax-yellow and are partially translucent. The faces are mostly rough. Like the phenacite, they occur either attached to yellowish quartz crystals or embedded in the loose chlorite, and are intimately associated with cassiterite, small crystals of which actually penetrate one of the scheelite crystals. It may here be remarked that wolframite, so common a mineral in other parts of Cornwall, has, I believe, only been recorded from one of the St. Just mines—namely, Balleswidden mine.

Cassiterite.

The cassiterite deserves no special remarks, other than that it occurs as small, black, prismatic crystals, combinations of $m\{110\}$ with $s\{111\}$ and $z\{821\}$. Some of the crystals are 'forked' twins similar to those from Dolcoath mine.

In conclusion it may be recalled that the precipitous cliffs of St. Just were long since very thoroughly explored in search of minerals by several early Cornish mineralogists, amongst whom were Robert Were Fox of Falmouth, Joseph Carne of Riviere, and John Hawkins of Trewithen.

[1] C. Le Neve Foster, Mineralogical Magazine, 1877, vol. 1, p. 74.