

*Note on the occurrence of beryl and löllingite at the New Consols mine, Stoke Climsland, Cornwall.*

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SPECIMENS of the minerals beryl and löllingite were found by me among material collected in the summer of 1950 and the spring of 1951 for work on the distribution of trace elements in the New Consols mine, Stoke Climsland, Cornwall. Unfortunately, I was unable to collect further material, and in the case of the löllingite its presence on a specimen was recognized only after the mine had been abandoned and become flooded. This locality for the two minerals seems worthy of record in view of the small number of reported occurrences in Cornwall.

BERYL.

The beryl was found in specimens from a pegmatite vein, approximately 2 feet thick and dipping steeply southwards towards the main granite boss of Kit Hill, which was intersected 222 yards from the engine shaft by a south cross-cut at the 52-fathom level. Most of the pegmatite, which has an ill-defined junction with the surrounding killas, is a moderately fine-grained aggregate of quartz, albite, and sodic muscovite; the coarsely crystalline part of the pegmatite consists of irregular grains of milky quartz and platy aggregates of muscovite, and it is in these latter that the crystals of beryl are found.

The crystals of beryl are dirty greenish-white in colour, and most of them are well-defined hexagonal prisms up to 6 mm. long and 4 mm. in diameter; no terminal pyramid faces could be detected, only the basal cleavage being present. Identification rests on the optical and other physical properties, and spectrographic determination of beryllium, aluminium, and silicon. Thin sections prepared from individual crystals (no beryl was to be found in thin sections of the pegmatite) show that they are extensively altered along an irregular network of cracks to kaolinite, and contain numerous hair-like liquid inclusions. Interference figures show the crystals under examination to be biaxial negative, with a small optic axial angle.

Other minerals present in small amount on the specimens are tourmaline, pale-purple fluorite, arsenopyrite, and a thin coating of chalcopyrite and blende on a joint face.

In the summer of 1951 Sir Arthur Russell collected specimens from a pegmatite vein 8 inches thick which had recently been cut during the extension of a north cross-cut at the 64-fathom level, rather more than 300 yards from the engine shaft. These specimens show a close similarity to those from the thicker pegmatite vein one-third of a mile to the south; the main difference lies in the presence of a greater amount of pale-blue and purple fluorite. One specimen shows a little granular pyrite, and another what appears to be a single small plate of pyrrhotine.

A careful examination of the specimens has failed to reveal any other beryllium minerals from the New Consols mine.

St. Michael's Mount has been known as a locality for beryl for many years,<sup>1</sup> and is referred to by J. Garby<sup>2</sup> together with Mabe and Constantine parishes near Falmouth. Greg and Lettsom<sup>3</sup> repeat this list, with the addition of Wheal Castle, near St. Just. More recently, J. Robson<sup>4</sup> adds Long Downs, near Mabe, as a separate locality, but Sir Arthur Russell<sup>5</sup> regards the Mabe and Constantine occurrences as incorrect, probably due to confusion with apatite. The only other recorded localities in Cornwall have been given by P. K. Ghosh<sup>6</sup> ('very limited' in heavy residues from the Bodmin Moor granite), A. F. Hallimond<sup>7</sup> (Beam mine, St. Austell), and J. Phemister<sup>8</sup> (South Crofty mine, Camborne). A pale greenish prism of beryl in granite from Swit quarry, Craddock Moor, Bodmin Moor, was presented by P. K. Ghosh in 1927 to the British Museum mineral collection.

<sup>1</sup> A. R. Barclay, *Beryl in Cornwall*, Ann. Philosophy, 1825, ser. 2, vol. 10, p. 383.

<sup>2</sup> J. Garby, *A catalogue of minerals found in Cornwall, with their localities*. Trans. Roy. Geol. Soc. Cornwall, 1848, vol. 7, p. 98.

<sup>3</sup> R. P. Greg and W. G. Lettsom, *Manual of the mineralogy of Great Britain and Ireland*. London, 1858, p. 126.

<sup>4</sup> J. Robson, *Cornish mineral index*. Trans. Roy. Geol. Soc. Cornwall, 1949, vol. 17, pt. 8 (for 1948), p. 464. [M.A. 11-273.]

<sup>5</sup> A. Russell, *Topaz from Cornwall, with an account of its localities*. Min. Mag., 1924, vol. 20, p. 225.

<sup>6</sup> P. K. Ghosh, *Petrology of the Bodmin Moor granite (eastern part)*, Cornwall. Min. Mag., 1927, vol. 21, p. 308.

<sup>7</sup> A. F. Hallimond, *Note on a specimen of white beryl from Beam mine, St. Austell, Cornwall*. Min. Mag., 1939, vol. 25, pp. 351-352.

<sup>8</sup> J. Phemister, *Note on an occurrence of bertrandite and beryl at the South Crofty mine, Cornwall*. Min. Mag., 1940, vol. 25, pp. 575-578.

## LÖLLINGITE.

Some time ago I was asked by Sir Arthur Russell to check whether some specimens he had collected from Castle-an-Dinas wolfram mine, St. Columb Major, in 1937 were in fact löllingite or arsenopyrite. Following on from this investigation, X-ray powder photographs were taken of my arsenopyrite specimens from New Consols mine, Stoke Climsland;



FIG. 1. X-ray powder photograph (cobalt radiation) of löllingite from Castle-an-Dinas mine, Cornwall. (High-angle end on the left.)

by a coincidence, the only one which had not been analysed spectrographically for trace elements was found to consist mainly of löllingite, with a little intergrown arsenopyrite. It may be mentioned in this connexion that the X-ray powder data obtained from the Castle-an-Dinas material (which showed no arsenopyrite lines in the pattern, fig. 1) correspond almost exactly with those given by M. A. Peacock,<sup>1</sup> while the American Society for Testing Materials data are in complete disagreement. Specific gravity determinations on the Castle-an-Dinas löllingite failed to give a value higher than 7.12, probably owing to the porous nature of the material; the highest value which the New Consols löllingite yielded was 7.08, but the separated material in these determinations always contained an appreciable amount of arsenopyrite.

The specimen of löllingite from New Consols, which was the only one found in the mine, came from a part of the main lode one foot from the hanging-wall, in a stope 70 feet above the 40-fathom level and 700 feet east of the engine shaft. The bulk of the specimen consists of finely granular löllingite with no well-formed crystals; on a partially polished surface coarse grains of arsenopyrite may readily be distinguished by the naked eye (taking a polish more easily than the surrounding löllingite), while under the microscope intergrowths on a smaller scale are seen to be present. Small amounts of chalcopyrite and pyrite are also present on the specimen. The arsenic minerals, from their observed relationship with the neighbouring gangue, appear to have replaced the brown

<sup>1</sup> M. A. Peacock, On the identification of minerals by X-rays. Trans. Roy. Soc. Canada, 1941, ser. 3, sect. 4, vol. 35, p. 111. [M.A. 8-280.]

quartz-tourmaline 'capel'; sharp grain boundaries between the löllingite and quartz may, however, be seen in one or two places. No general conclusions may be drawn from this isolated occurrence as to the role of löllingite in the mineralization of the New Consols lode.

This discovery of löllingite at New Consols confirms the observation by J. H. Collins<sup>1</sup> that it 'probably [occurs in] many other Cornish mines', having frequently been mistaken for arsenopyrite; he records the occurrence of löllingite ('leucopyrite') at East Pool and Dolcoath mines, and C. Le Neve Foster<sup>2</sup> gave Pedn-an-Drea mine as another locality. The occurrence at Castle-an-Dinas wolfram mine has previously been noted by J. Robson.<sup>3</sup>

In 1935 Sir Arthur Russell collected a specimen of löllingite, which has recently been identified by G. F. Claringbull, from the Tregargus china-stone quarry, St. Stephen-in-Brannel; in this case the mineral forms a granular coating on a joint face on a block of partially altered granite, and is intergrown with quartz, felspar, and a little purple fluorite. I have been asked to put this occurrence on record. In the mineral collection of the British Museum there are specimens of löllingite from Wheal Sparnon, Redruth.

<sup>1</sup> J. H. Collins, *A handbook to the mineralogy of Cornwall and Devon*. Truro and London, 1871, part II, p. 62.

<sup>2</sup> C. Le Neve Foster, *On some new mineral localities in Cornwall and Devon*. *Min. Mag.* 1877, vol. 1, p. 74.

<sup>3</sup> J. Robson, *Trans. Roy. Geol. Soc. Cornwall*, 1947, vol. 17, pt. 6 (for 1946), p. 347; 1949, vol. 17, pt. 8 (for 1948), p. 456. [M.A. 11-273.]

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