Hingston Down Quarry and Hingston Down Consols, Cornwall

[SX 410 718]

Introduction

Hingston Down Quarry lies approximately 2 km west of Gunnislake, in east Cornwall, and is a large working aggregate quarry. The quarry works the small granite intrusion of Hingston Down, part of a granite ridge situated midway between the Bodmin Moor and Dartmoor granites. The fine-grained biotite granite at Hingston Down is traversed by numerous nearly vertical, approximately E–W-trending veins, and mineralized joints containing various minerals including chalcopyrite, arsenopyrite, sphalerite, molybdenite, wolframite, scheelite and fluorite. The rare beryllium silicate mineral bertrandite was recorded from the quarry (Ward, 1983), and arthurite, the rare copper iron arsenate mineral, has been recorded from the dumps of Hingston Down Consols, and is indeed the type locality for the mineral (Davis and Hey, 1964). A description of Hingston Down Consols Mine and some of the lodes which pass through the quarry was provided by Dines (1956). Further planned development of the quarry will be to the east, where borehole logging is believed to have shown further supplies of good-quality, fine-grained, 'grey' granite.

Description

This GCR site comprises the active quarry at Hingston Down and the adjacent disused mine and spoil tips immediately south and south-west of the working quarry faces (see (Figure 7.59)). The quarry continues to expose a deep section through the south-western part of the Hingston Down Granite, and the associated mineralized zones. Mineral veins previously worked in the Coxpark section of Hingston Down Consols used to be exposed in the western faces of the quarry. At most times the south-eastern faces of the quarry expose mineralized veins, often quartz-filled and usually associated with a pegmatitic facies of the granite.

The Hingston Down Granite mass is irregular in shape, and although of only a relatively small mass it is similar in character and composition to the major Cornish granite masses. The granite is a mostly grey (tending to brown when weathered), fine-grained biotite granite, sometimes porphyritic and with pegmatitic bodies formed commonly within the granite wall-rock. Tourmalinization occurs at the contact. A detailed description of the granite was given by Ward (1983).

Occasionally, mineralized features occur in the quarry that are sufficiently persistent to be mappable. These minor lodes are rather atypical of others in the area and consist of discontinuous lenticular masses of sulphides (sphalerite, chalcopyrite, wolframite, pyrite and arsenopyrite), which occur either as individual masses or in complex intergrowths. Best exposures are usually in the south-eastern faces of the quarry and across the quarry floor. Where it occurs, mineralization in the lodes tends to pinch and swell and discolours the quarry faces. Mineralization is therefore of a sporadic nature and is rarely traceable for more than a few metres. Many of these minor veins are quartz-filled and good opal specimens are sometimes found.

Hingston Down Consols was originally worked for copper. The various shafts of the Hingston Down Consols group worked several lodes which are mainly in metamorphosed country rock ('killas') at the surface but run into granite at a relatively shallow depth and are reported to pass downwards from a copper zone into a tin zone of mineralization. To the west of the sett an east–west quartz-feldspar porphyry ('elvan') dyke was said to traverse both the killas and granite. The mine has a recorded output for the period 1916 to 1919, but ceased working shortly after. Current interest is in the minerals found in the mine dumps. The largest dumps are centred upon the remains of the old engine-house, and much of this area is cordoned off due to possible danger caused by local stoping. However the dumps are sufficiently large to provide good examples of the mineralization. The dump material tends to be variable with no overall production pattern, and both tin- and copper-zone mineralization occurs together with later-stage lead mineralization, the latter tending to fill small fractures in chalcopyrite-rich specimens. It is probable that outputs from various parts of the mine have been mixed on these dumps. Good specimens of arthurite can still be obtained from the dumps, along with scorodite, carpholite, pharmacosiderite, and beudantite, while the rare minerals hidalgoite and carminite have been recorded. In addition,

recent studies have shown Hingston Down Quarry to be the joint first recorded site for jeanbandyite and natanite (the other being Penberthy Croft Mine) (see Betterton *et al.,* 1998). However, Ryback *et* al. (2001) have demonstrated that the late A.W.G. Kingsbury falsified the localities of numerous rare mineral species. This deception affects a number of locations in the South-west England, including Hingston Down Quarry and Hingston Down Consols. Therefore care should be exercised when considering claims by Kingsbury which have not been substantiated or duplicated by subsequent collectors.

The workings are situated at the south-west corner of the granite outcrop, where there are two major lodes about 30 fathoms apart. The more northerly Main Lode has been developed from Bailey's Shaft and Morris's Shaft. South Lode was opened up by Hitchen's Shaft. On the Main Lode, Morris's Shaft was sunk in granite, but Bailey's Shaft commences in killas and enters granite at about 75 fathoms depth. The record from this shaft describes well the mineralized sequence observed: copper ores and arsenopyrite occupied the highest level, accompanied by some tin and wolframite, while at depth the sulphides die out, although cassiterite and wolframite tend to persist.

Another section of the mine, known as 'Lower Hingston', was opened up by an adit in killas in the Coxpark Valley. The Coxpark Lode used to be exposed in the western face of the quarry (Dines, 1956), but the adit is not now visible and is at present covered by stockpiled aggregate.

Interpretation

At the Hingston Down GCR site there is some mineralization directly associated with the granite, which is related to normal granite processes and often related to the formation of tourmaline. Sometimes cavities occur in slightly greisenized granite containing schorl, fluorite, chlorite and pyrite. It was from an open joint-fissure in the granite that small crystals of the beryllium silicate bertrandite were found associated with fluorite and quartz (Ward, 1983).

Hingston Down Consols originally worked a series of parallel, approximately E–W-trending, Sn-Cu lodes both in granite and killas, and within the pronounced Gunnislake–Hingston–Kit Hill granite ridge. Mineralization is related to, and of the same age as, the main-stage hydrothermal mineralization of the South-west England orefields, but the presence of lead minerals in the assemblage implies a late stage of mineralization associated with north–south cross-courses. Dines (1956) stated that the known cross-courses occurred on the deeper levels of the Main Lode west of Bailey's Shaft. There is some evidence of a reverse zonation of the Sn-Cu mineralization (that is copper in granite and tin in killas), but this still needs to be substantiated and interpreted. Whether this granitic ridge can be interpreted as an emanative mineralization centre is still open to discussion.

Arthurite, the copper-iron arsenate first described from Hingston Down Consols (Davis and Hey, 1964) occurs as apple-green crusts sometimes intimately mixed with pharma-cosiderite. It would appear to be a supergene or secondary mineral formed either due to reactions within the mine or on the dumps, copper, iron and arsenic being in plentiful supply in both oxidizing environments.

Beryllium-bearing minerals are rare in Southwest England, but have been recorded from Cheesewring Quarry (Bowman, 1911), St Cleer (Russell, 1913) and Trolvis Quarry, Stithians (Hosking, 1954). At all of these localities the bertrandite occurs as a primary phase in fissures in granite and is of late-stage, hydrothermal origin. Analyses have shown that leuocogranites at Hingston Down contain up to 33 ppm Be.

It appears that at Hingston Down, beryllium is concentrated in the residual magma, and the frequent association of fluorite with bertrandite in greisenized joints in the granite (and in other Cornish occurrences), suggests migration of Be in aqueous F-bearing solutions, perhaps as a mobile complex in the hydrothermal stage, with final reaction of the fluids with wall-rocks resulting in formation of bertrandite and fluorite.

Conclusions

Hingston Down Quarry continues to work a granite mass for aggregate, from time to time exposing pegmatitic-hosted mineralization. Lode mineralization is also exposed in the quarry, while the dumps of Hingston Down Consols are still

fertile in a variety of mineral assemblages. Hingston Down Consols is the type locality for arthurite, a copper iron arsenate mineral.

References

(Figure 7.59) Hingston Down Quarry (Photo: JNCC.)