Great Wheal Fortune, Cornwall

[SW 627 289]

Introduction

Great Wheal Fortune was an ancient mine. Cunnack (unpublished ms) reported an inscribed date of 1760 from the 80-fathom level, probably on Carnmeal Lode, located on the east side of a valley 0.8 km ENE of Breage, near Helston. Several lodes branch into a stockwork near the surface where they have been worked opencast. These are known as the 'Conqueror Branches', and can still be studied. Earlier mine-workings have been exposed in the later open-pit excavation. It is a relatively narrow excavation, being 10 m in length and some 18 m in depth.

The stockwork consists of nearly vertical minute tin-bearing cracks. Mineralization is in the Devonian Mylor Slate Formation meta-sedimentary rocks ('killas'), which are also cut by a series of quartz-feldspar porphyry ('elvan') dykes.

The workings of Great Wheal Fortune are mainly east of the stream which drains out of Porthleven harbour, which follows the course of the Great Fluccan (see below). The deposit lies to the east of the Tregonning–Godolphin Granite (see (Figure 7.13)), in an area where many lodes are displaced over a distance (up to 1 km) southwards by a NNW–SSE–trending fault known locally as the 'Great Fluccan' (Dines, 1956). Normally in Cornish mining terms a 'fluccan' is a day- and iron-oxide-filled but unmineralized cross-course. However, a few kilometres to the south, near Porthleven, the Great Fluccan becomes a focus for lead mineralization at the Wheal Penrose GCR site. The lodes on the east side of the Great Fluccan are important metal producers, thousands of tons of cassiterite and much copper ore having been recovered.

Recorded outputs for Great Wheal Fortune between 1855 and 1868 are 2569 tons of 'black tin' (unrefined tin ore) and 322 tons of copper ore. Tributers (the miners) worked the opencast in later years, and Collins (1912) recorded 423 tons of black tin being recovered between 1873 and 1896. In later years some arsenic and wolframite were raised as well as 3.5 tons of silver ore in 1880. Last output records are for 1896.

Description

The opencast Great Wheal Fortune is divided into two parts by the road track to Carnmeal Downs. The whole area is now much overgrown, especially at the south-western end, where the near-vertical faces are hard to view. The larger part of the opencast north-west of the road can be viewed from various access points, and access can be made to the open-pit floor by a steep path along the northern face. From the floor of the open-pit facing south large stopes can be seen following a mineralized structure trending east-west. To the north of the opencast, thin greisen-bordered veins and stringers trend ENE–WSW. The stoped-out feature is believed to follow a very altered elvan dyke, which has been extensively mineralized.

Great Wheal Fortune, south of Wheal Vor, is interesting due to the formation of both a stockwork of greisen-bordered veins as well as mineralized lodes, leading to two types of working, namely mining of lodes and open-pit working of greisen veinlets. Dines (1956) reported that five lodes have been worked to considerable extent and two other lodes tried.

From the north the chief lodes are Cornmeal Lode (coursing E20° and dipping 40°S), Blueburrow Lode (coursing E30°N, with a slight southerly underlie), Copper (Middle) Lode (coursing E33°N and underlying steeply north), Main (Engine) Lode (coursing north-east and underlying up to 15°S) and New Lode (coursing E35°N and underlying 26°S). Dines (1956) also reported that westwards New Lode joins the hangingwall of Main Lode, which beyond the juncture splits towards the surface to form a stockwork known as 'Conqueror Branches'.

The lodes listed above were worked by a large number of shafts, some of which can be seen fenced and capped amongst the present-day vegetation. A number of elvan dykes have been reported throughout the workings, although because of the extensive vegetation it is not now possible to be sure of the position of these.

Interpretation

Dines (1956) reported that the Great Wheal Fortune ore occurs as light yellowish-grey crystals of cassiterite in veinlets or joints up to *c.* 2.5 cm or so wide (Collins, 1912), with quartz, 'gilbertite' (muscovite mica), tourmaline and some topaz. The killas between the joints is tourmalinized and carries some cassiterite. An elvan dyke crosses the main mineralized belt, and is said to heave the veinlets about 9 m horizontally. It looks here as though some of the mineralization at least post-dates the elvan intrusion, although Collins (1912) regarded the latter as having been formed after tourmalinization of the killas but before the infilling of the mineralized joints. There is still considerable discussion of this age relationship, especially as to whether Dines (1956) quoted Collins (1912) correctly. Hosking (1964) believed that Collins observed that the veinlets were distinctly cut by a quartz porphyry dyke and displaced by it. Unfortunately most of the exposures described by Collins (1912) are either overgrown or not now available.

There is the possibility therefore that there are two distinct phases of mineralization, one pre-elvan intrusion and another post-elvan intrusion. Discussion was focused on the evidence of the opencast sheeted-vein complex, which appears to be similar mineralogically, and indeed petrologically, to those associated with Li-mica granite intrusions elsewhere in Cornwall, although here the veinlets are within the killas. This vein complex is reported to be displaced by a mineralized elvan dyke. However, of considerable interest is the fact that the underground workings strike along a lode system, which is recorded as intersecting an elvan dyke, and which causes refraction of the lode system.

Time relationships and the nature of elvan intrusion and mineralization at Great Wheal Fortune clearly warrant further research. However, it may be that the lode system follows an earlier stockwork in the area and some of the late hydrothermal tin mineralization is derived from such a stockwork. From the observations of various workers, the sequence of events leading to the deposits of Great Wheal Fortune appears to have been as follows:

1. intrusion of Li-mica granite (Tregonning Granite) into a type-C biotite granite (Godolphin Granite), as described in the Tremearne Par GCR site description;
2. formation of the ENE-trending sheeted-vein complex with some greisenization above the roof of the Tregonning Granite (tourmaline-topaz-'gilbertite'-cassiterite);
3. displacement of this vein complex by an elvan dyke, in a fissure trending east–west;
4. main-stage hydrothermal tin vein mineralization, superimposed within lines of weakness associated with earlier mineralization, with the tin derived from these earlier structures. Where the hydrothermal vein intersects elvan dykes it is refracted and the dykes mineralized (i.e. the elvan dykes could have acted as channel-ways to mineralizing fluids; and finally
5. formation of Great Fluccan, causing down-faulting to the east and preservation of the mineralization.

Conclusions

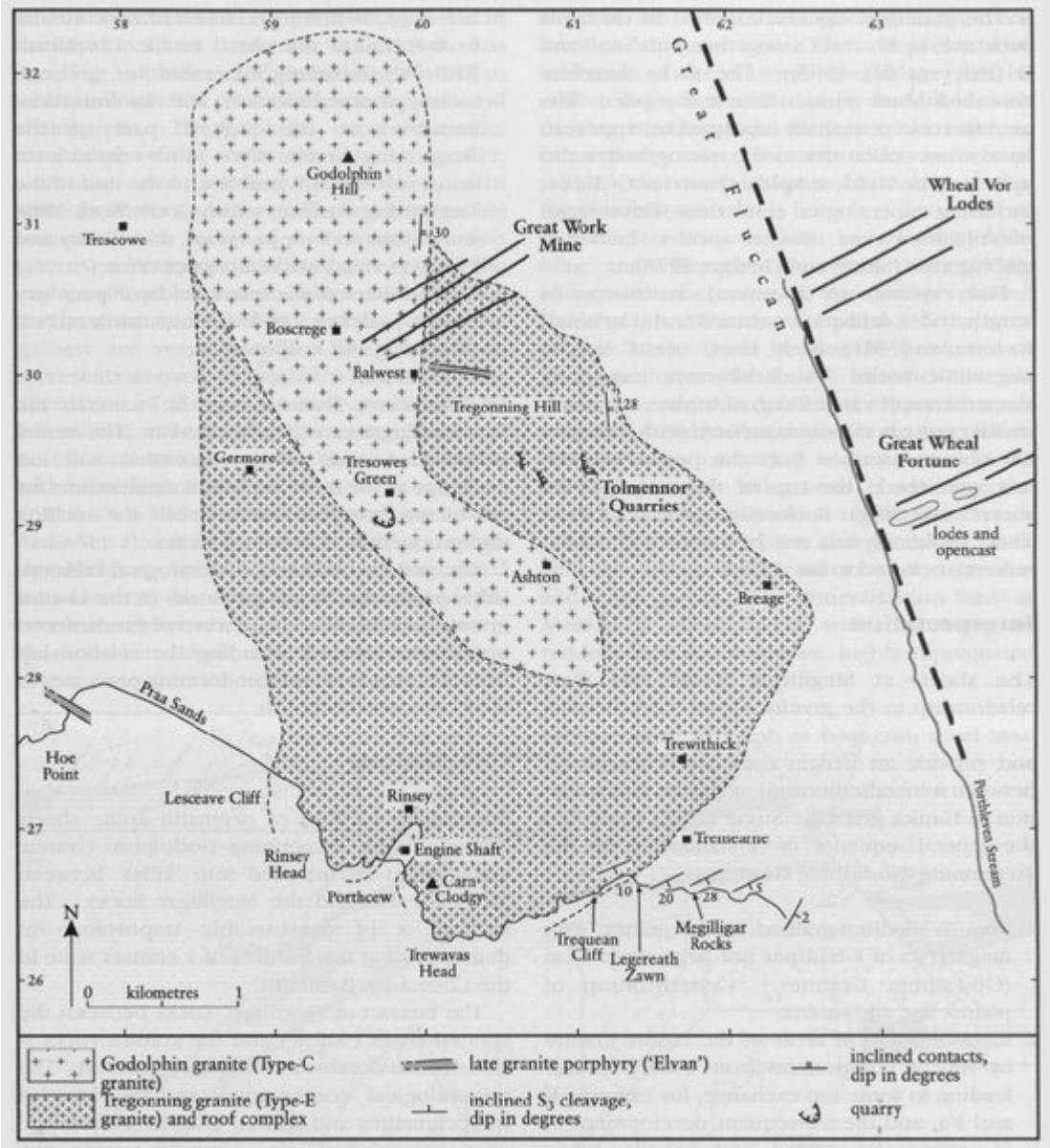
This very old, and now much overgrown, opencast is still potentially important in demonstrating mineralization in the Mylor Slate Formation metasedimentary rocks close to the Tregonning Granite. Most interestingly the mineralization occurs in several different environments, namely:

1. a stockwork of greisen-bordered veins;
2. in true lode structures;
3. mineralized elvans.

However, further studies are needed to clarify the age relationship of these phases of mineralization, although certainly the tin mineralization of Great Wheal Fortune is of two generations, namely a sheeted-vein complex within killas probably directly associated with granitic intrusion, and hydrothermal veins closely associated with elvan dyke intrusion.

Unfortunately, observations of many of the most interesting features of the structures and mineralization at Great Wheal Fortune are now obscured by rockfall from the faces and intense vegetation.

References



(Figure 7.13) Geological sketch map of the Tregonning–Godolphin Granite. The area without ornament is composed of the Mylor Slate Formation. Solid lines mark exposed boundaries; dashed lines mark inferred boundaries. After Stone (1969). Granite boundaries modified by Taylor and Wilson (1975).