
C18 Cameron (Beacon) Quarry

[SW 704 506]

Highlights

This quarry contains the only surface exposure of the St Agnes Granite contact, with rare pervasive greisenizing, which is possibly unique in Britain. There is also replacement and telescoped ore mineral paragenesis.

Introduction

Cameron (or Beacon) Quarry is situated about 800 m WNW of St Agnes Beacon on the north coast of Cornwall, and is the only place where the St Agnes Granite contact, with the country rock of Upper Devonian hornfels, is exposed at the surface. Together with the Cligga Head Granite, 5 km to the north-east, this granite forms a small cusp on a northerly prolongation of the Cornubian batholith (Bott *et al.*, 1958; Tombs, 1977).

At the contact between the sedimentary rocks and the biotite granite, the pelites have been metamorphosed to spotted hornfelses, and the granite has a fine-grained margin with some pegmatitic patches.

The main interest in the quarry lies in the widespread, pervasive greisenizing, which is very rare; silicification; the development of disseminated cassiterite and sulphide mineralization. Reid and Scrivenor (1906) described some of the replacement phenomena, and Hosking (1964) and Hosking and Camm (1985), who give a full description of the quarry (Figure 5.21), proposed a complex paragenesis in which the relations between greisenizing and mineralization are examined in detail. They ascribe these features to permeation of the granite by fluids moving through it along a network of 'knife-edge' and microscopic fissures. Bromley and Holl (1986) consider the fracture system to be unrelated to the greisenizing, the impermeable cover of the granite cusp being more important in giving rise to a 'Vonding' effect.

Description

The country rocks round Cameron Quarry are the semipelitic and psammitic Porthtowan Formation (formerly the Ladock Beds, a subdivision of the more extensive Upper Devonian Gramscatho Group), and although the psammities at the contact show little obvious signs of alteration, loose fragments on the ground surface show that thermal metamorphism has caused spotting of the hornfelses, with andalusite developed in pelitic bands. These features are additional to tourmalinization caused by the underlying granite and which preceded greisenizing. The contact with the granite is seen at the northern end of the quarry (Figure 5.21), and within a metre or two of the igneous rock, which is normally a medium- to coarse-grained, poorly megacrystic biotite granite with megacrysts up to 20 mm long (Dangerfield and Hawkes, 1981; Type B, (Table 5.1); Exley and Stone, 1982) has a chilled, fine-grained texture. Fine-grained contacts are not common in Cornwall, as is demonstrated at the contacts at Rinsey Cove and Porth Ledden for example. There is also a pegmatitic facies visible at the contact in places.

Massive and pervasive greisenizing and silicification give much of the granite an abnormally dark colour, fine grain size and glassy appearance. There has been extensive alteration of feldspar megacrysts to greisen locally, and although some have been eroded to leave hollow moulds, others, near post-greisen fractures, have been replaced by aggregates of minerals which conspicuously include cassiterite. Mineralization, in the form of disseminated copper sulphides, is best seen in the north-east and south-west corners of the quarry.

Interpretation

Almost always in south-west England (and generally elsewhere in Britain), greisenizing is very obviously related to a joint or fracture system. This is not the case in Cameron Quarry where, although varying in intensity, nearly all the granite has

been altered, first by greisenizing and then by silicification. Hosking and Camm (1985) believe this permeation to have been achieved as a result of the development of a complex network of fine fractures due partly 'to contraction and partly ... to the pressure exerted by residual fractions in the magma'. Bromley and Holl (1986), on the other hand, state specifically that the quarry contains 'massive greisen not related to penecontemporaneous fractures' and presume that 'the greisenizing solutions were ponded beneath the impermeable carapace of tourmalinized hornfelses'. There seems to be no reason why both should not be right if the 'network of fine fractures' is on a scale approaching the microscopic and regarded as distinct from the usual type of megascopic joint system. It is certain, however, that mineralization took place in a series of steps following the influx of pulses of fluid as suggested by Halls (1987), and that it varied in degree over very short distances.

Following the early stages of alteration, during which most of the feldspar was replaced by secondary mica and quartz or dissolved to leave cavities, there was extensive cassiterite and Cu, As, Fe and Zn sulphide mineralization via open, although still very narrow, 'knife-edge' fractures, and this resulted in both disseminated deposition and infilling of the feldspar moulds. Replacement was in two stages: K-feldspar was removed before deposition of cassiterite, and wolframite and plagioclase before deposition of sulphide. Virtually the full range of Cornish mineral parageneses is represented in a small vertical span; there is, therefore, a telescoped version of the mineral zonation so well known from the famous Camborne–Redruth mining district not far to the south. The mines of the St Agnes area and Cligga Head also show this effect, but less distinctively. Detailed study here shows that mineral deposition took place in stages, as it did elsewhere, with reactivation of channelways from time to time (Hosking and Camm, 1985). Unlike Cligga Head, Cameron Quarry rocks exhibit very little kaolinization, largely because most of the feldspar had already been altered to quartz and mica, but also because less water was available at the low temperature stage following greisenizing.

The date of the intrusion of the St Agnes granite has not been established but the main mineralization in western Cornwall was at about 270 Ma BP (for example, Jackson *et al.*, 1982; Darbyshire and Shepherd, 1985), substantially after granite emplacement; and the pattern of events seen at both Cameron Quarry and Cligga Head has close similarities with the general chronology of the mineralized areas round Camborne and St Just.

Conclusions

This is a unique site in which can be seen the widespread effects of greisenizing, silicification and intense mineralization in a 'telescoped' succession in which the effects are superimposed rather than in distinct zones, all less closely related to jointing than is normal.

[References](#)



(Table 5.1) Petrographic summary of main granite types (based on Exley et al., 1983)