
B12 Clicker Tor Quarry

[SX 285 614]

Highlights

The ultramafic rocks of this site are unique in the Variscan of south-west England in that they contain fresh olivine. They differ greatly from the ultramafic rocks of the Lizard Complex.

Introduction

The site consists of the walls of the disused and flooded elongate quarry at Lower Clicker, just south of Menheniot. The distinctive, blue-green rock has been extensively quarried for road metal since the early nineteenth century.

The Clicker Tor ultramafic body (Figure 4.31) occurs within the Middle Devonian (largely Givetian) Milepost Slate Formation (Burton and Tanner, 1986) and is closely associated with basic intrusives, as well as pillowed lavas and volcanoclastics (Ussher, 1907). Little recent work has been done on this body, which is referred to in the early Geological Survey literature as an augite picrite (e.g. Reid *et al.*, 1911), although texturally it resembles an ultramafic cumulate. Chemical analyses have been given by Parker (1970).

Description

The mapped form of ultramafic body here and its close association with gabbros (north quarry wall) suggests that it was originally intrusive or part of an intrusion, although the actual contacts with the adjacent sediments are no longer visible. The general lack of internal and marginal shearing could imply that the ultramafic rock unit was not thrust into place as a cold slab, but formed by crystal accumulation from a larger intrusive basic body after emplacement. There has been some minor internal movement, however, as seen by the development of slickensiding and the polishing of joint surfaces coated with asbestiform amphibole.

The brittle, dark-blue rock was originally composed of subrounded cumulate olivine, interstitial clinopyroxene and numerous magnetite granules (Figure 4.32). Plagioclase appears to be absent, although small, highly altered, lath-shaped areas subophitically enclosed by the pyroxene suggest its former presence in very minor amounts. A rare feature for a Variscan ultramafic rocks is the preservation of a little fresh olivine. Much of the rock has been altered or serpentinized, with olivine replaced and veined by serpentine minerals, a colourless amphibole (tremolite?) and chlorite, as well as being peppered with magnetite. A strongly pleochroic fibrous stilpnomelane is associated with or replaces the pyroxene. The overall primary composition and texture of the Clicker Tor mass suggest that it was a cumulate phase produced by the mafic fractionation of a large basic body prior to partial serpentinization.

Interpretation

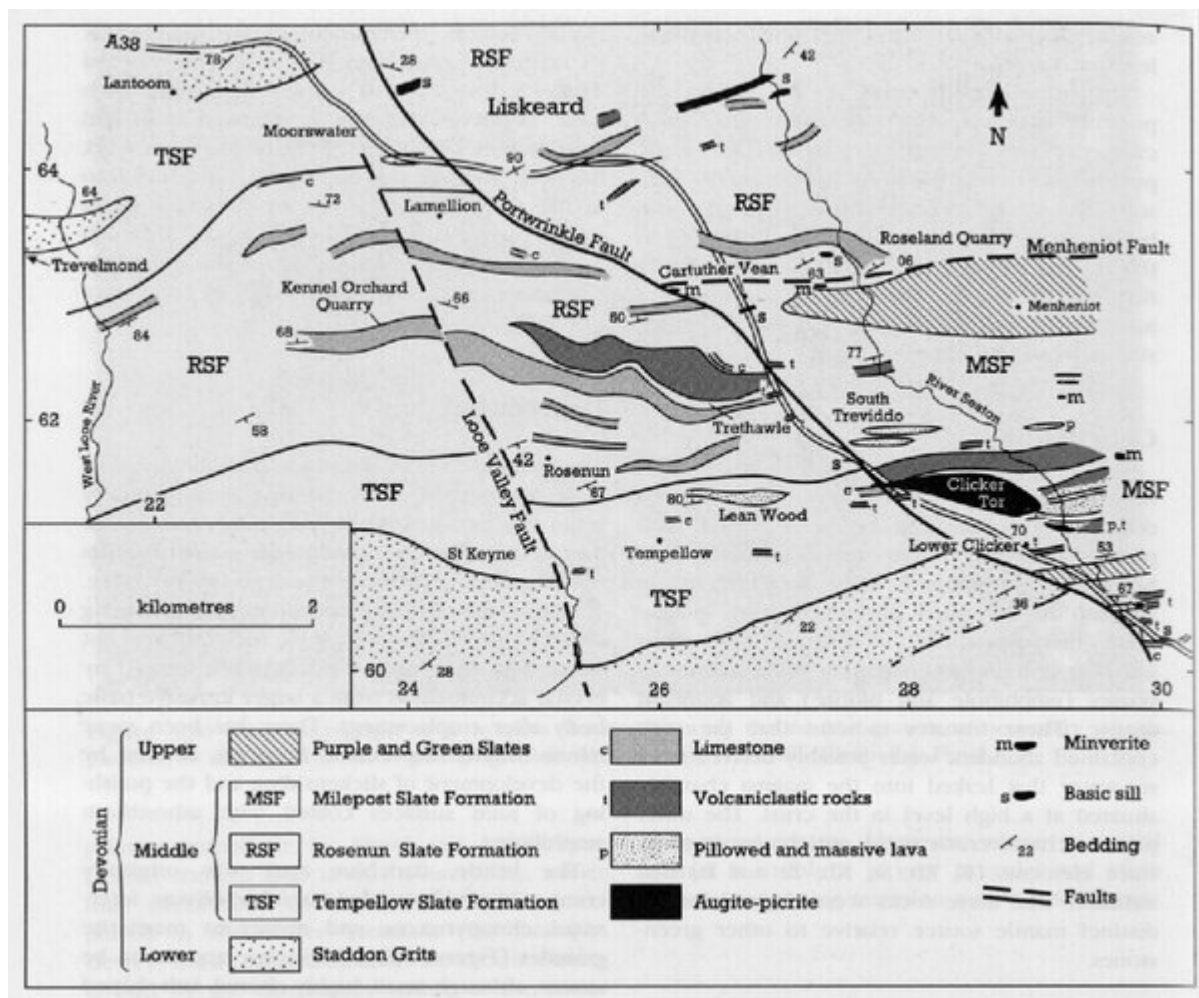
The importance of this site concerns the presence of a relatively rare ultramafic unit probably derived from associated basic intrusives by mafic fractionation. Texturally, it is an olivine-rich cumulate and it has a similar chemical composition to the ultramafic cumulates of major, fractionated, stratiform basic massifs. It is probably unique for Variscan ultramafic rocks in retaining fresh olivine after partial serpentinization. It is chemically and mineralogically distinct from the ophiolitic Lizard peridotite and in no way resembles a fragmented or tectonized portion of ultramafic rocks commonly associated with ophiolites which are often high Cr–Ni harzburgites. It is also mineralogically different to the Polyphant Complex ultramafics in that it does not contain any primary hydrous phases as sometimes seen at Polyphant (as discussed below). This feature indicates that the cumulates were derived from a fractionating, anhydrous basic body different from those that crystallized primary hydrous phases.

The presence of primary olivine, a single pyroxene and possibly plagioclase indicate that the rock is probably a picritic cumulate rather than a peridotite or pyroxenite. Chemical analyses by Parker (1970), who was principally interested in the chemical and mineralogical effects due to weathering, showed that the fresh rock had high, but variable, MgO (23–28 wt. % range) and TiO₂ contents, but low Ni values (<1000 ppm) that are generally typical of stratiform-related ultra-mafic cumulates.

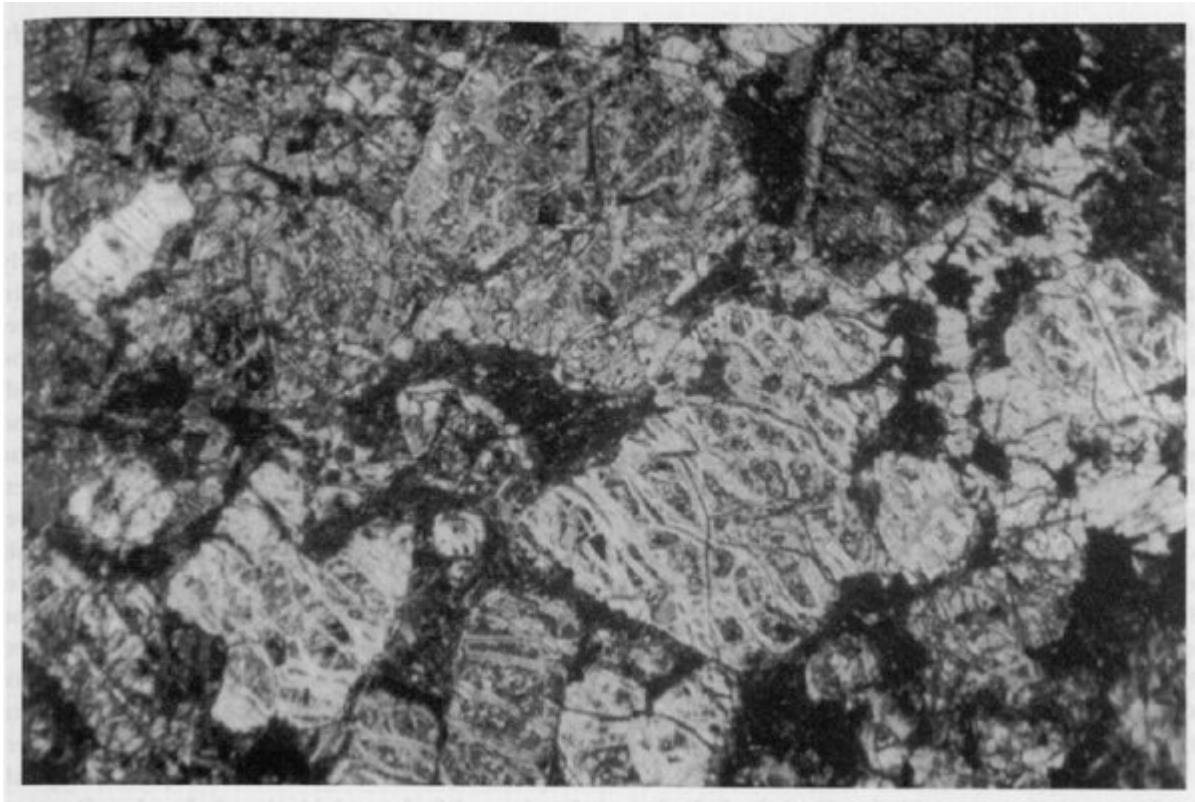
Conclusions

Here a body of ultramafic rock associated with dolerite intrusives is emplaced into Middle Devonian (380-million-year-old) sediments and lavas. The rock is thought to have been formed within a large magma chamber as an accumulation of crystals (cumulate) which settled out during the early phases of cooling of the magma that subsequently crystallized as the adjacent dolerites. It is unique among Variscan ultramafics in showing some fresh olivine, which in similar rocks (Lizard peridotite) is invariably replaced by serpentine minerals. However, much of the body had been altered by the process of serpentinization whereby primary Mg–Fe silicates are variably replaced by serpentine together with amphibole and chlorite. The chemistry of the Clicker Tor body is distinct from that of the ultramafics at Polyphant in this area and in the Lizard Complex.

References



(Figure 4.31) Geological map of the area to the south of Liskeard showing the location of the Clicker Tor ultramafic body (after Burton and Tanner, 1986).



(Figure 4.32) Photomicrograph of partly altered olivine crystals (with veins) and intercumulus pyroxene in the ultramafic body at Clicker Tor, Cornwall. (Photo: P.A. Floyd.)