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# Cullimore's Quarry

[ST 7198 9269]

## Introduction

This disused quarry is a classic site that has been widely documented in the literature. Situated 450 m N40°W of the level crossing at Charfield Green in the Tortworth Inlier (Figure 3.14), it exposes the higher of two Silurian lava flows found in the Tortworth area. The lower basaltic flow, commonly termed the 'Lower Trap', is exposed in Damery Quarry [ST 7045 9440], where it lies unconformably on the Micklewood Beds, of Tremadoc age. The 'Upper Trap', the top of which is exposed in Cullimore's Quarry, separates the Damery Formation below from the Tortworth Formation above. Curtis (1972) reported that the Upper Trap is about 50 m thick on the eastern side of the inlier, but wedges out westwards; Cave (1977), however, gave a thickness of 64 m at Charfield Green, from where it thins slightly southwards and markedly northwestwards. The first reports of the two lavas were published in the early 19th century, and a history of the early work has been provided by Curtis (1955b). Detailed petrographical studies of both lavas have been published by Reynolds (1924) and Cave (1977), and Van de Kamp (1969) gave several chemical analyses including results from a sample from Cullimore's Quarry (also listed by Cave, 1977). Curtis (1972) regarded the constant stratigraphical position of the Upper Trap, together with the contact features at Cullimore's Quarry, as evidence that it was a flow rather than an intrusion, but could not determine whether or not it was submarine.

The upper surface of the flow is irregular and contains pockets of fossiliferous ashy limestone, first reported as interbeds within the trap by Weaver (1824). A sketch and section of one pocket was provided by Reed and Reynolds (1908b, p. 515), who observed the limestone to occupy a hollow in the upper surface of the lava. Fossils from the limestone have been listed by several authors, including Reed and Reynolds (1908a, b), Curtis (1972) and Cave (1977).

The quarry is of importance to demonstrate lower Silurian volcanic activity in the southern Welsh Borderland, and is especially significant as it displays the contact between the upper lava and the overlying sediments.

## Description

Petrographical studies indicate that the now altered Upper Trap was originally a contaminated felsic basalt containing clinopyroxene, orthopyroxene and some olivine (Sanderson in Cave, 1977). The upper surface exposed at Cullimore's Quarry is deeply weathered, but is clearly irregular; amygdalae are evident in places. The basal limestone of the Tortworth Formation comprises a coarsely crystalline cement containing fossil material, especially brachiopods, fine ashy particles and larger clasts of basalt; Reed and Reynolds (1908b) reported an exposed thickness of about 60 cm. Immediately beneath the limestone a thin (2–8 cm) band of fine-grained material, resembling hornstone (Weaver, 1824) or baked shale (Reed and Reynolds, 1908b), has been reported to lie directly on the lava.

The limestone contains abundant and very diverse fossils, especially brachiopods, including *Costistricklandia lirata*, and tabulate corals, especially *Favosites multipora*. The small and important rugose coral *Palaeocyclus porpita* was reported by Curtis (1972) from a thin calcareous sandstone band just above the limestone. Reed and Reynolds (1908a, b) also listed bryozoans, gastropods, trilobites and cornulitids from the hollows. Acetic acid dissolution of a limestone sample has yielded the conodonts *Distomodius staurognathoides*, *Ozarkodina gulletensis*, *Kockelella ranuliformis* and *Aulacognathus* sp.. The entire fauna is indicative of a late, but not latest, Telychian age.

## Interpretation

Although widespread bentonite bands provide evidence of volcanic activity in the Welsh Basin from the Llandovery to early Ludlow epochs, there are few examples of lava flows. These are largely restricted to the southern part of the Welsh Basin and can be seen, for example, at the sites at Marloes, Cullimore's Quarry and Moons Hill Quarry; these sites

expose lavas of early Llandovery, late Llandovery and Wenlock age respectively. The relatively localized distribution of these outcrops indicates that volcanicity was much more restricted in Silurian times than during the preceding Ordovician Period. The two lavas in the Tortworth Inlier are essentially of similar basaltic composition, with the differences attributed to different cooling histories and to contamination of the magma (Sanderson in Cave, 1977).

The stratigraphical setting shows that the Upper Trap was a submarine lava flow. The relatively deep water *Costistricklandia* benthic community is present in the upper two-thirds of the underlying Damery Formation, and Ziegler *et al.* (1968b) reported the *Eocoelia* and *Costistricklandia* communities at two localities in the basal beds of the Tortworth Formation on top of the lava. At Cullimore's Quarry, the fauna in the limestone on top of the flow can also be attributed to the *Costistricklandia* Community (Cave, 1977), indicating little difference in local sea depth before and after the extrusion.

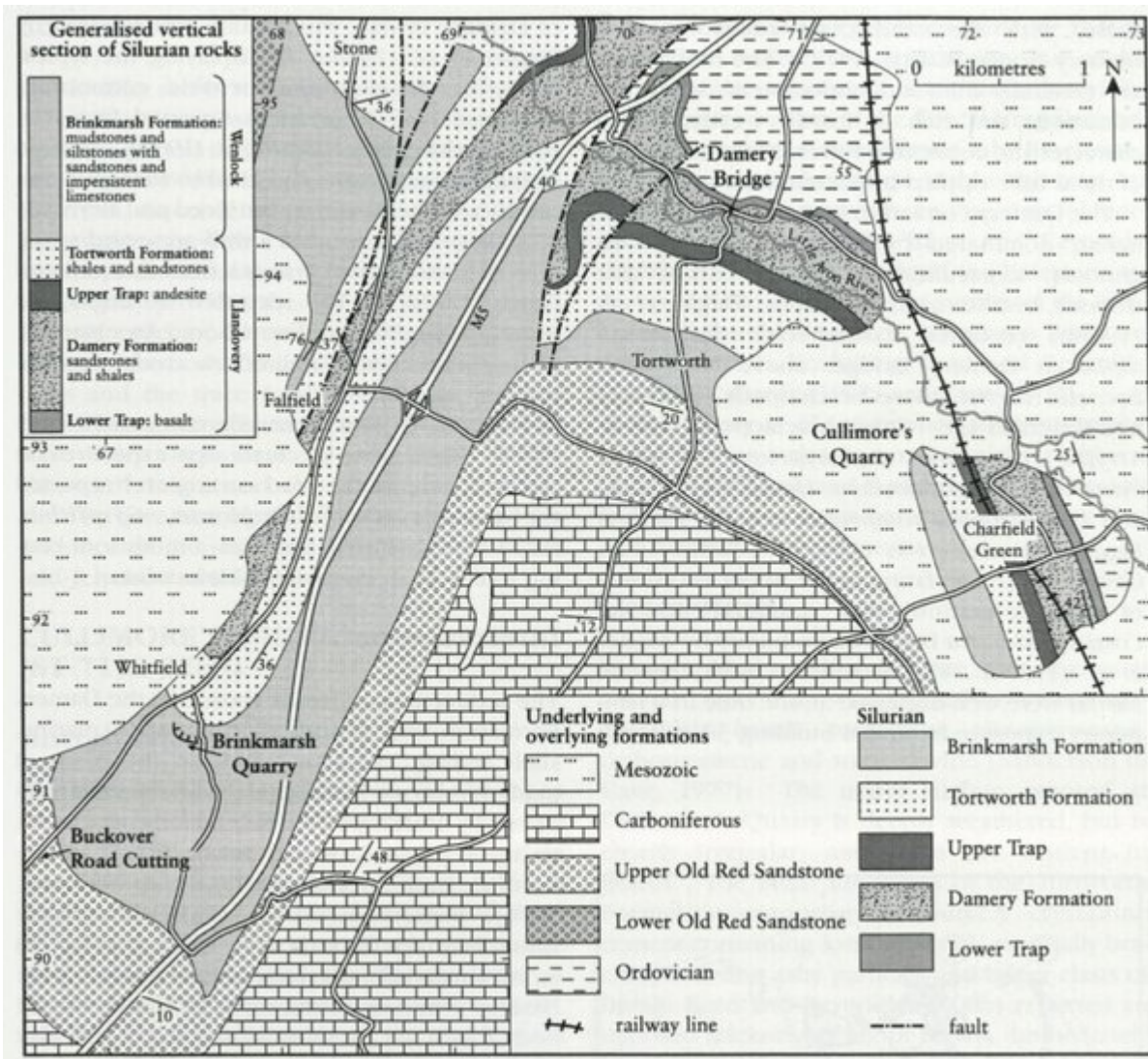
There is some uncertainty as to whether the ashy material and volcanic clasts in the limestone indicate that this is a calcite-cemented tuff, or whether the volcanic material was incorporated from the decomposing lava surface (Cave, 1977). In either case, the inclusion of volcanic clasts in the basal limestones indicates that the igneous rock was a lava, not an intrusion.

## Conclusions

This site displays one of the few lava flows in the Silurian succession of the Welsh Basin and gives direct evidence of volcanic activity in the Tortworth area in late Llandovery times. The presence of ashy material and clasts of volcanic rock in the overlying limestones provides evidence that this basaltic igneous body is extrusive rather than intrusive, and the marine faunas that bracket the flow locally indicate that it was submarine. The limestones, which represent the basal beds of the Tortworth Formation, occur in pockets and hollows in the upper surface of the lava and contain a rich fauna, dominated by diverse brachiopods and corals.

This locality, along with those at Marloes and Moons Hill Quarry provides direct evidence of early Silurian volcanicity in the southern part of the Welsh Basin. It is of particular importance as it demonstrates the nature of the upper surface of the flow and its contact with the overlying sediments. The macrofauna and microfauna in the overlying limestone pockets provide a good example of the late Telychian biota of the Midland Platform shelf sea. This is a key locality for the study of the regional Lower Silurian faunas, sedimentation and volcanicity.

## [References](#)



(Figure 3.14) Geological map of the Tortworth Inlier (after Curtis, 1972).