Buttington Brickworks

[SJ 266 101]

Introduction

The first full account of the rocks of the area around Welshpool, Powys, was published by Wade (1911), who briefly reviewed earlier references to the geology of the district, including observations by Murchison (1839), Ramsay (1866, 1882) and Watts (1885). Wade (1911) divided the Llandovery strata of the district to the east of Welshpool into two units, the 'Can Group' and the 'Buffington Group'. He also noted the complex structure of the area, recognizing a general folding along north-north-easterly axes that produced steep dips in some places.

Whittard (1932) also dealt with the rocks of the Buttington district as part of his investigation of the Llandovery strata of Shropshire. He did not follow the stratigraphical scheme proposed by Wade (1911), but applied the same terms he had used for Llandovery strata throughout Shropshire. Thus, the Cefn Group of Wade was assigned to the Pentamerus Beds, and the Buttington Group to the Purple Shales. Ziegler *et al.* (1968b), however, reinstated the local names introduced by Wade, as the Cefn Beds and Buttington Shales; Palmer (1970) subsequently formalized these as the Cefn Formation and the Buttington Mudstone Formation. Cave and Dixon (1993) used the name Buttington Shales Formation for the upper unit, noting, as had Wade (1911), the equivalence of this formation to the Tarannon Shales of the Geological Survey (Ramsay, 1882). Loydell and Cave (1993) preferred to use the name Tarannon Shales Formation for this unit.

The Cefn and Buttington Mudstone formations are exposed intermittently along an 8 km strip of country to the north-east of Buttington Railway Station. The largest exposures by far are in the quarry at Buttington Brickworks (Figure 3.16), 4 km north-east of Welshpool, where a continuous section is exposed from the upper Cefn Formation, through the entire Buttington Mudstone Formation and into the lower part of the overlying Trewern Brook Mudstone Formation. Lower beds in the Cefn Formation can be seen in a small, overgrown old quarry [SJ 2638 1004] by the roadside west of the brickworks quarry. Cocks *et al.* (1992) gave the thickness of the Cefn Formation as 91 m and that of the Buttington Mudstone Formation as 107 m, while Loydell and Cave (1993) measured the thickness of the Buttington Mudstone Formation at Buttington Brickworks as just under 80 m. A full description of the brickworks locality was given by Cave and Dixon (1993), with further details, particularly on the graptolites of the Buttington Mudstone Formation, being provided by Loydell and Cave (1993).

While the brick pit was active, this locality provided excellent continuous exposures through representative Telychian and lower Wenlock strata of the area within the western part of the Welsh Borderland Fault System. The exposures are now somewhat degraded, but still show the lithological characteristics of the units and yield occasional graptolites. Microfossils of various types occur in the strata close to the boundary between the Buttington Mudstone Formation and the Trewern Brook Mudstone Formation, and together with the graptolites enable location of the Llandovery–Wenlock boundary in this section (Figure 3.17). The Wenlock strata are described in Chapter 4 of this volume.

Description

The basal beds of the Cefn Formation lie unconformably on Ordovican strata, and can be seen in the old quarry at [SJ 2638 1004]. The lowest metre is conglomeratic and contains pentamerid brachiopods; above this are bioturbated pale grey-green silty mudstones with interbedded fine sandstones in beds about 8 cm thick. Ziegler *et al.* (1968b) recorded *Stricklandia lens* cf. *intermedia* in the lower part of the formation, indicative of an Aeronian age. In contrast, the recognition of *Spirograptus turriculatus* near the top of the formation (Zalasiewicz, in Cave and Dixon, 1993) led Cave and Dixon (1993) to suggest that most, if not all, of the Cefn Formation may be of Telychian age. An unpublished conodont collection from low in the old quarry includes fragmentary specimens comparable with *Ozarkodina oldhamensis,* which would be consistent with an Aeronian age for this part of the section.

The top 6 m of the Cefn Formation are exposed in the north-west face of Buttington Brick Pit. Here, grey mudstones are interbedded with thin sandstones, ranging from less than 2 cm to 5 cm thick; the tops of some of the sandstones are rippled, giving a direction of flow from east to west (Ziegler *et al.,* 1968b). Detailed measured sections from this point, through the nearly vertically bedded Buttington Mudstone Formation and into the Trewern Brook Mudstone Formation were given by Cave and Dixon (1993, pp. 71–3) and Loydell and Cave (1993). The lithology is entirely of mudstones, which are grey at the base, red and green through the bulk of the formation, and increasingly buff towards the top. At least nine bentonitic horizons occur, cream or pink in colour, with the thickest towards the top of the formation.

Graptolites have been reported from five horizons in the Buttington Mudstone Formation (Loydell and Cave, 1993). The lowest horizon is near the base of the formation and has yielded *Spirograptus turriculatus, Streptograptus johnsonae* and *Pseudoplegmatograptus obesus,* indicating the *turriculatus* Biozone (*johnsonae* Sub-biozone). A second horizon, 30 m above the base, contains chitinozoans, tiny brachiopods and well-preserved graptolites; these include abundant *Stimulograptus clintonensis,* together with smaller numbers of *Streptograptus exiguus, Monograptus veles, Pristiograptus nudus, Petalolithus wilsoni* and '*Monograptus*' *arcuatus.* Loydell and Cave (1993) referred this fauna to the *crispus* Biozone, or possibly the lower *griestoniensis* Biozone. The top three horizons are close together, 10–15 m below the top of the formation. They have yielded a diverse graptolite fauna, including *Monograptus spiralis, Monograptus priodon, Monograptus parapriodon, Monoclimacis vomerina* and *Monoclimacis geinitzi.* Loydell and Cave (1993) regarded the upper two horizons as unequivocally of *spiralis* Biozone age, whereas the fauna of the lowest of the three probably indicates the lower *spiralis* Biozone or possibly the preceding *crenulata* Biozone.

Chitinozoans found in conjunction with the graptolites have not been identified, but Mabillard (1981) recovered leiosphaerid acritarchs from the upper metre of the Buttington Mudstone Formation. Other microfossils within the upper part of the formation include conodonts, with *Dapsilodus obliquicostatus, Panderodus langkawiensis* and *Panderodus panderi* dominant (Mabillard, 1981). The Buttington Mudstone Formation at Buttington Brickworks is also the type locality of the trilobite *Proromma powysensis* Curtis and Lane, 1998.

The base of the Trewern Brook Formation is taken at the top of a prominent bentonite, where there is a lithological change to more calcareous sediments. The lowest 9 m of the formation are bioturbated silty mudstones, with rare brachiopods and trilobites and very sparse, fragmentary graptolites, including *Retiolites geinitzianus.* Loydell and Cave (1993) referred these strata to a new member, the Butterley Mudstone Member, of the Trewern Brook Mudstone Formation. Mabillard (1981) recorded the incoming of diverse acritarchs of Acritarch Biozone 5 (of Hill, 1974) 3 m above the base of the member, and reported the biozonal conodont *Pterospathodus amorphognathoides* a little higher. He concluded that the base of the Wenlock Series probably occurs in the lower part of the Trewern Brook Mudstone Formation, a conclusion echoed by Loydell and Cave (1993). Higher levels in the Trewern Brook Mudstone Formation have yielded *Cyrtograptus centrifugus* and *Cyrtograptus murchisoni* (Cocks and Rickards, 1969).

Interpretation

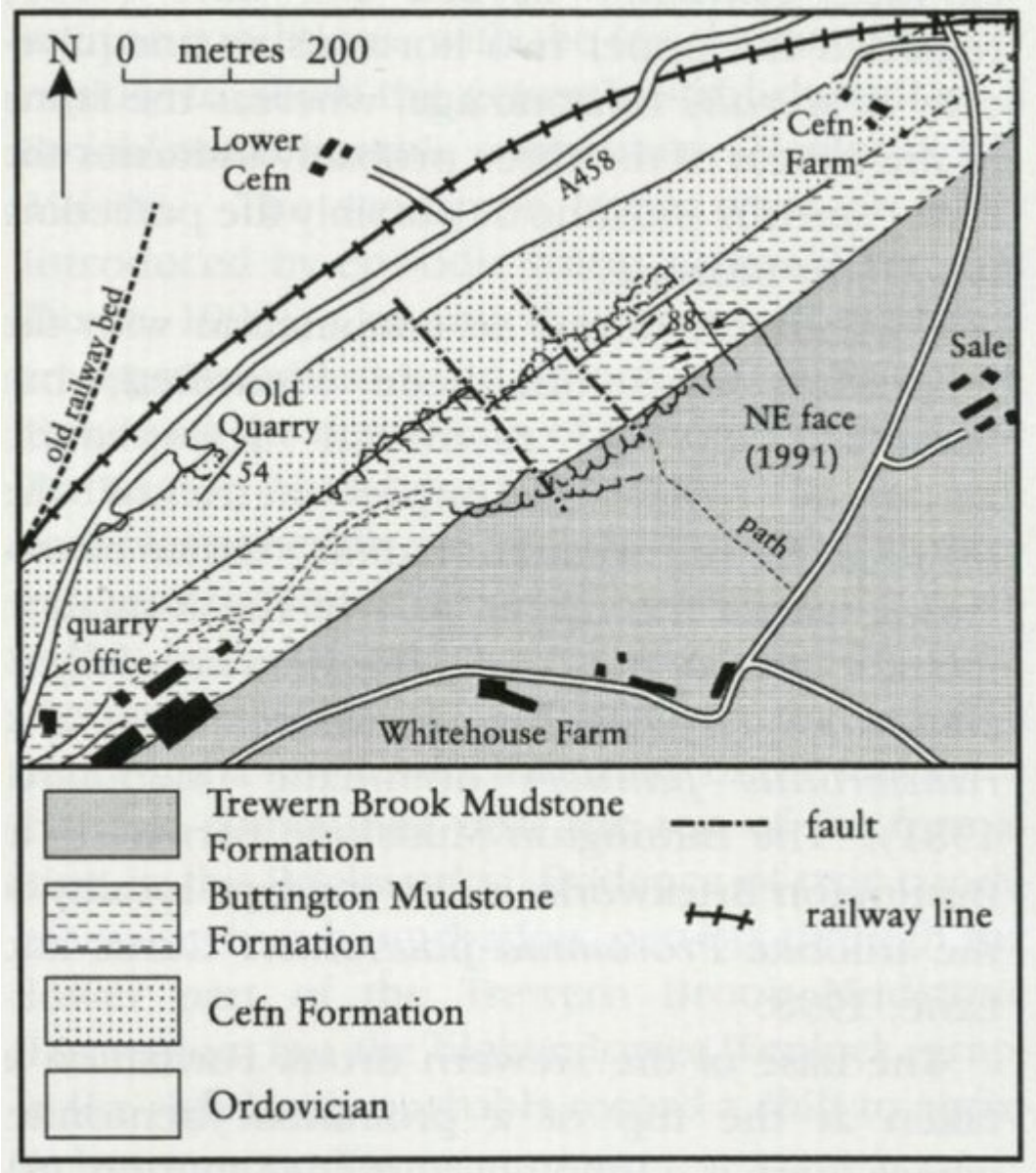
Situated within the Welsh Borderland Fault System, the Buttington area is regarded as being part of the platform region, lying east of the line of the Towy Anticline and the Severn Valley Fault (Loydell and Cave, 1993). The spread of the sea from the Welsh Basin probably reached the area in late Aeronian times, and the first sediments of the Cefn Formation represent the shoreline deposits of this eastward transgression. The rest of the formation was deposited in shallow marine conditions, with the sea deepening fairly rapidly to allow the general establishment of a *Stricklandia* benthic community (Ziegler *et al.,* 1968b). The sandstone layers were probably introduced by episodic storm surges (Cave and Dixon, 1993). Continued, or renewed, eastward transgression led to an abrupt change in conditions and the deposition of the mudstones of the Buttington Mudstone Formation. The sea bottom was generally oxygenated through this period, as trace fossils are evident even in the graptolitic horizons, which probably represent brief dysaerobic intervals. Ziegler *et* al. (1968b) recorded a few fossils indicative of the *Clorinda* benthic community near the top of the formation in the Brickworks. Evidence of oxic conditions, such as bioturbation, persists through the lower part of the Trewern Brook Mudstone Formation, but the higher, lower Wenlock, graptolite-rich levels probably record a shift to anoxic bottom conditions.

Together with the sites at Hope Quarry, Hillend Farm and Wistanstow, this locality records the progress of the eastward transgression of the Llandovery sea across the Welsh Borderland Fault System. The benthic fauna at Buttington is much less abundant than at the other localities, but the reasons for, this are not clear.

Conclusions

This locality exposes a continuous section through the Telychian sedimentary sequence on the western part of the Midland Platform, within the area affected by the Welsh Borderland Fault System. The basal Llandovery beds, of Aeronian age, are exposed nearby, and the succession records the flooding and deepening of the sea during its eastward transgression across this area in the late Llandovery. Typical sediments of the Cefn and Buttington Mudstone formations and of the Butterley Mudstone Member are well exposed, and contain graptolitic horizons, which provide a basis for international correlations. Microfossils, including conodonts, acritarchs and chitinozoans are reasonably common in the upper beds exposed, and indicate that the base of the Wenlock Series is probably within the lower part of the Butterley Mudstone Member. These are by far the best exposures of Llandovery strata in this area, and have a high conservation value.

References



(Figure 3.16) Geological sketch-map and lithostratigraphy for Buttington Brickworks (modified after Loydell and Cave, 1993).

(Figure 3.17) The south-eastern part of the main (north-east) face at Buttington Brickworks, showing the upper part of the Buttington Mudstone Formation (to the left) and the lower part of the Trewern Brook Mudstone Formation. (Photo: Derek J. Siveter.)