
Trwyn-llêch-y-doll

[SH 302 235]

Introduction

This section shows particularly well the unconformable base of the Arenig and the facies and trace fossils of the transgressive sandstone unit above the unconformity.

In the little inlet immediately west of the headland of Trwyn-llêch-y-doll, Arenig sediments can be seen unconformably overlying Middle Cambrian mudstones. Ramsay (1881, p. 209, fig. 76) described the section as having the 'appearance of an unconformity' but considered it more likely to be a 'case of false bedding' (Figure 9.6). It was described in detail by Nicholas (1915), who confirmed the presence of the unconformity and who considered the 'Arenig Tudwal Sandstone' (a term he introduced) to be of early Arenig (*extensus* Zone) age. This assessment of age was followed by Crimes, who used the section when describing ichnofacies and trace fossils in North Wales (Crimes 1968, 1969, 1970c, d), but more recently Beckly (1987) revised the age and regarded the entire Arenig sequence on St Tudwal's Peninsula as being of late Arenig (Fennian) age.

Description

The Tudwal Sandstone forms an almost vertical cliff some 36 m high. The Middle Cambrian Ceiriad Formation (Young *et al.*, 1994) crops out at the base of the cliff and on the beach, dipping ESE at 30°. The plane of unconformity is seen at the base of the cliff dipping east (Figure 9.6), disappearing below beach level before the headland of Trwyn-llêch-y-doll is reached.

The Arenig sediments dip at a lower angle (14°) to the ENE. The base of the succession is marked by a thin conglomeratic unit with large pebbles of Gwna Quartzite and jasper derived from the Monian Supergroup. Nicholas (1915, p. 106) noted the apparent absence of clasts derived from the underlying Cambrian. The conglomerate is overlain by a thin, coarse-grained, current-bedded sandstone, described by Crimes (1970d) as a *Cruziana* Sandstone Facies, from the common occurrence within it of the trace fossil *Cruziana furcifera* (d'Orbigny), believed to be a trilobite track. Nicholas (1915, p. 106) recognized a coarse basal grit, divided into two units 0.75 m thick, separated by a soft, shaly band. It is overlain by some 9 m of bluish rusty-weathering sandstone (the 'streaky sandstone' of Nicholas, 1915, p. 110) that Crimes (1970d) placed in his Fodinichnia shaly sandstone facies, feeding burrows being abundant. The streaky appearance is due to thin laminae of argillaceous material. Higher in the succession the *Cruziana* Sandstone Facies reappears at intervals, but much of the thickness of strata is in Nicholas' streaky sandstones'. Beckly (1987) included all this sequence within the *Neseuretus* sandstone facies, and reported that the eponymous trilobite had been recorded from the St Tudwal's Peninsula, but did not specify the precise locality. The only body fossils found at Trwyn-llêch-y-doll are extensiform graptolites from the top of the cliff (Nicholas, 1915, p. 111). No recent appraisal of these has been published.

Most of the cliff is inaccessible, but parts of the succession can be examined on the steep slope down to the inlet, and sedimentary structures and trace fossils can be studied in fallen blocks.

Interpretation

The Tudwal Sandstone is a typical transgressive sequence, deposited in an inshore environment. With its coarse sandstones and large-scale tabular and trough cross-bedding, with large-scale symmetrical ripples, Crimes (1970d) considered the *Cruziana* Sandstone Facies to be deposited under conditions of relatively high current velocity and probably oscillatory water movement. He believed that the inorganic and biogenic sedimentary structures together suggested deposition above wave-base, but in the sublittoral zone. Because the Fodinichnia shaly sandstone facies comprises fine sandstones and siltstones, commonly with small-scale cross-stratification, whereas large-scale

cross-stratification and ripple marks occur more rarely, it is likely to have been deposited in quieter, deeper waters than the *Cruziana* Sandstone Facies, possibly in the sublittoral zone near or below wave base and out of reach of tidal scour (Crimes, 1970d). Coarser beds within the Fodinichnia shaly sandstone facies, generally adjacent to the *Cruziana* sandstone facies, with the trace fossil *Phycodes circinatum* Magdefrau, might have been deposited in a higher energy, possibly slightly shallower-water environment than the finer beds with *Teichichnus*.

In the northern part of St Tudwal's Peninsula, Beckly and Maletz (1991) recorded *Azygograptus lapworthi* Nicholson from the 'Transition Beds' that succeed the Tudwal Sandstone. The occurrence of this species allows correlation into the Lake District sequence, and provides some biostratigraphical control for the higher part of the sequence in the mid- to late Fennian. On Beckly's (1987) palaeogeographical model, St Tudwal's Peninsula remained an emergent area until the early Fennian, during which time the Arenig sediments at Trwyn-llêch-y-doll were deposited.

Conclusions

Trwyn-llêch-y-doll affords a clear section through the Tudwal Sandstone, a transgressive shallow-water sandstone at the local base of the Arenig Series, and shows an admirable section of the basal unconformity. The unconformity is seen to be much more profound than at Bryn Glas, but less so than at Wîg.

[References](#)



(Figure 9.6) Trwyn-llêch-y-doll, St Tudwal's Peninsula, looking north-east. Bioturbated sandstones of the Tudwal Sandstone Formation (Arenig, probably Fennian) form a vertical cliff and overlie the basal beds of the Ceiriad Formation (Cambrian, probably St David's Series) with unconformity. The total height of the cliff is about 45 m. (Photo: A.W.A. Rushton.)