Marros Sands

Highlights

Marros Sands has the best available sequence through the Millstone Grit on the Pembrokeshire north crop. It shows characters of both the north crop on the main part of the coalfield and the south crop of Pembrokeshire.

Introduction

Millstone Grit is extensively exposed along the coast near Telpyn Point and Ragwen Point, east of Amroth, Dyfed [SN 183 073]–[SN 198 075] and [SN 219 071]. Unlike most Upper Carboniferous sequences in Dyfed, the sequence here has suffered relatively little tectonic disturbance. The field geology has been described by Strahan *et al.* (1909, 1914), Reading (1971) and Kelling and George (1971). Stratigraphical and sedimentological details are also given in an unpublished thesis by G.T. George (1970).

Description

Lithostratigraphy

Exposed at Telpyn Point and Ragwen Point is an almost complete sequence through the Millstone Grit in this part of the coalfield, totalling 195 m (Figure 4.7). Between the promontories (a distance of about 2 km) there is little exposure but due to the low angle of dip, however, only a few metres of shale are missing from the visible succession.

As along most of the north crop, the Millstone Grit here is divided into three formations: the Basal Grit, Middle Shales and Upper Sandstone locally known as 'Farewell Rock'. The Basal Grit is *c.* 40 m thick and lies unconformably on Viséan (?Brigantian) Carboniferous Limestone. It consists of five coarse quartzites, separated by dark, carbonaceous shales. The shales, which include thin ribs of siltstone and bands of septarian limestone nodules, are frequently bioturbated and probably represent fluvial overbank or distal crevasse-splay deposits. The quartzites have erosional bases and demonstrate a variety of cross-stratification morphologies. They are thought to represent distributary- or crevasse-channel deposits. G.T. George (1970) has interpreted the sequence as deposited in a regressive fluvial, flood-plain environment, transected by distributary channels, the latter probably being braided.

The Middle Shales Formation consists of six coarsening-upwards cycles, and attains a total exposed thickness of *c.* 105 m. The base of each cycle is marked by black mudstones, mostly representing lagoonal or brackish-marine deposits. These are overlain by increasingly coarse siltstones, which are progressively more proximal delta-front deposits, and are in some cases capped by sandstones formed as offshore shoals or beach barrier bars. The interval clearly represents a series of delta transgressions (G.T. George, 1970).

Overlying the Middle Shales is a prominent sandstone unit. Traditionally, it was referred to as the Farewell Rock. However, it is significantly lower, stratigraphically, than the 'classic' Farewell Rock in the main part of the South Wales Coalfield. In the Tenby–Saundersfoot Coast site discussed above, a sandstone body in a similar stratigraphical position is known as the Upper Sandstone Formation and it seems reasonable to use the same name for the sandstone here.

The Upper Sandstone Formation is *c.* 30 m thick, and is a major, fining-upwards cycle. At the base, which is erosive on the Middle Shales, there are shale and coal rafts, quartz clasts and ironstone pebbles. Most of the rest of the formation is thick, trough cross-stratified sandstones, but towards the top there are ripple and cross-stratified siltstones, eventually topped by a seat earth and coal. According to G.T. George (1970) they are delta-top deposits, mainly point- and channel-bar accretions, succeeded by floodbasin lake (?crevasse-splay) and eventually back-swamp deposits. The coal, which marks the top of the Upper Sandstone Formation, is immediately overlain by a marine mudstone — the Subcrenatum Marine Band.

Biostratigraphy

Few fossils have been reported from the Basal Grit at Ragwen Point. Comparing it with other sequences on the north crop, it would be expected to range from the Chokierian or possibly upper Arnsbergian, up to the Kinderscoutian (e.g. Vale of Neath — see below). From the thickness of the sequence, it probably does not range below the Kinderscoutian. Kelling and George (1971) report unnamed Pendleian conodonts from two levels within the lower half of the formation, but the evidence has not been documented. The biostratigraphical evidence from these strata is clearly in need of revision.

The black mudstones in the Middle Shales have yielded mostly restricted assemblages of *Anthracoceras* sp., *Lingula* sp., *Sanguinolites* sp. and *Carbonicola* sp. Jones (1974) correlated the mudstone at the base of the fourth cycle in this formation with the Anthracoceratites Marine Band recognized elsewhere (e.g. Tenby–Saundersfoot and Vale of Neath), but there is nothing in the assemblage which separates it from most of the other mudstones in this sequence.

The mudstone at the base of the topmost cycle of the Middle Shales contains a far more characteristically marine assemblage, including *Cancelloceras cancellatum* (Bisat), *Agastrioceras carinatum* (Frech), *Caneyella* sp. and mollusc spat (Archer, 1965; G.T. George, 1970). This clearly belongs to the *C. cancellatum* Zone, indicating the lower Yeadonian.

The mudstone at the top of the succession contains *Gastrioceras subcrenatum* (Frech) and thus is taken as the junction between the Namurian and Westphalian series.

Interpretation

This is by far the most complete section through the north crop Millstone Grit in Dyfed. There is also a good sequence exposed along the St Brides Bay coast (Archer, 1965), which includes the Sigma Marine Band not found at Marros (possibly represented in the gap between Ragwen and telpyn points). However, the St Brides Bay sequence does not include the lower part of the Millstone Grit (Basal Grit Formation).

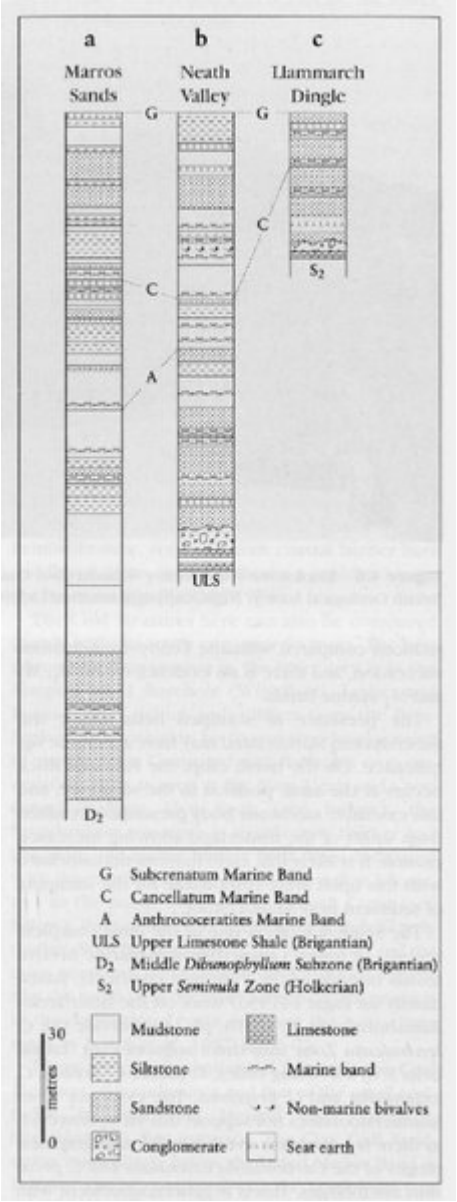
The sequence at Marros appears to demonstrate features of both the north crop of the main part of the coalfield, and the south crop of Dyfed. Like the north crop further east, there is an essentially tripartite formational division. However, the topmost arenaceous formation is not the Farewell Rock, such as in the Vale of Neath (see below) sequence, but the Upper Sandstone Formation of the Dyfed south crop at Tenby–Saundersfoot. This clearly reflects how the Millstone Grit of South Wales was being generated by a series of discrete fluvial systems, independently introducing sediment into the basin.

The Marros section also demonstrates clearly the contrasting sedimentary regimes that produced the Basal Grit and Upper Sandstone formations. The latter appears to represent a large, relatively simple delta-system with a heavily laden river probably flowing from the north-west. In contrast, the Basal Grit was generated by a complex set of small, coalescing deltas, possibly controlled by a number of structural axes.

Conclusions

Marros Sands is a nationally important site for understanding the evolution of Britain during the Namurian, approximately 310–320 million years ago. The exposed sequence shows Millstone Grit, including two thick units of sandstone, known as the Basal Grit and the Upper Sandstone. These are thought to be the deposits of river deltas that spread out from upland areas further north, in central Wales. Between the sandstones is an interval of shales, representing a time when the river delta had retreated, allowing more marine sediments to be deposited. Although there are other well-exposed sequences through this part of the Millstone Grit in South Wales, that at Marros Sands combines a unique set of characters allowing geologists to understand how the river deltas developed at this time.

References



(Figure 4.7) Millstone Grit successions of the north crop of the South Wales Coalfield. All after Jones (1974, fig. 24).