The Triassic red beds of South Wales

Introduction

The Sherwood Sandstone Group is poorly represented at outcrop in this area. The main rep resentatives are the Budleigh Salterton Pebble Beds and succeeding Otter Sandstone formations seen in west Somerset (Edmonds and Williams, 1985; Edwards, 1999). The Mercia Mudstone Group succession in South Wales and around Bristol consists mainly of undifferentiated red mudstones, the old 'Keuper marls', and no attempt has been made to erect a formal stratigraphical scheme (Warrington *et al.,* 1980, pp. 47–8). In the Bristol area, the lower part of this succession appears to pass laterally into the Redcliffe Sandstone Formation (Kellaway and Welch, 1993).

The Mercia Mudstone Group consists mainly of red mudstones composed of red, fine-grained sediment largely representing wind-blown dust that settled into hypersaline water bodies that retained open connection with the sea. In nearby deeper basins, such as the Worcester Graben and the Somerset Basin, considerable thicknesses of halite also accumulated.

The upper part of the Mercia Mudstone Group succession, probably all that above the level of the Arden Sandstone Formation, is best known in South Wales, especially in Glamorgan and Gwent (Ivimey-Cook, 1974), where the sediments rest unconformably on Palaeozoic rocks, mainly the Carboniferous Limestone, which formed a series of islands in the South Wales area (Figure 3.58). The low-lying regions between the limestone islands were occupied by broad, hypersaline, water bodies that were probably seasonal (Tucker, 1977, 1978), and filled after heavy rains. When the rain stopped, there was a long phase of evaporation that transformed the water body first into an extensive mudflat, and then into a desiccated evaporate-encrusted pan. Over time, and through many such filling-evaporation cycles, vast thicknesses of undifferentiated red mudstones accumulated, with numerous sedimentary indicators of evaporation and desiccation, such as pseudomorphs after halite, algal laminae, mudcracks, syneresis cracks, and tepee structures (Tucker, 1978).

The palaeogeography of South Wales at the time has been reconstructed in detail (Tucker, 1977). It has been possible to map the major river systems, palaeochannels, and alluvial fans that brought coarse sediment down from the Welsh uplands into the northern margin of the water body (Figure 3.58)b. Sheet floods and screes accumulated around the margins of the uplands. In places, the pattern of erosion of the Carboniferous Limestone rocks at the margin of the water body shows stepping and other evidence that this was precisely the coastline, where water lapped on the low cliffs, creating shore platforms (Figure 3.58)c. In these marginal shore regions, stromatolites developed, an indication of brackish-water conditions (Tucker, 1977, 1978).

The coarse basal and marginal facies within the Mercia Mudstone Group in South Wales has long been called the 'Dolomitic Conglomerate', which, of course, is likely to be a diachronous unit. The red mudstone succession in the Mercia Mudstone Group is overlain, as almost everywhere in the British Isles, by the Blue Anchor Formation. The Penarth Group (see Chapter 4 of teh present volume), represented by the Westbury and Lilstock formations, and the lowest beds of the Lias Group, complete the Triassic sequence. A diagrammatic section through. the South Wales region (Figure 3.59) shows how successive Triassic units filled the basins and gradually overlapped the landscape formed on the Carboniferous Limestone (Wilson *et al.,* 1990).

Dating the red mudstones in the Mercia Mudstone Group is difficult since fossils are rare. Dinosaur footprints from the Barry Island region (Tucker and Burchette, 1977; Lockley *et al.,* 1996) confirm only a generalized Late Triassic age, as do the remains of the dinosaur *Thecodontosaurus* from the 'Dolomitic Conglomerate' of Bristol (Benton *et al.,* 2000). The Blue Anchor Formation yielded fossil plants, fishes, and bones of amphibians and reptiles, but, again, these are of little value for dating. Palynomorphs, however, indicate a latest Triassic, or Rhaetian, age (Orbell, 1973). The Penarth Group has produced rich microfloras and faunas of Rhaetian age (Orbell, 1973; Waters and Lawrence, 1987; Swift and Martill, 1999).

Four GCR sites have been selected to represent the palaeogeographical and palaeoenvironmental aspects of the South Wales area of the Severn Basin Late Triassic stratigraphy: Sutton Flats for the alluvial fans; Barry Island for the stepped shoreface features; Hayes Point to Bendrick Rock for the sedimentary evidence of the playa and the dinosaur footprints, and Sully Island for evidence of evaporitic conditions in the playas.

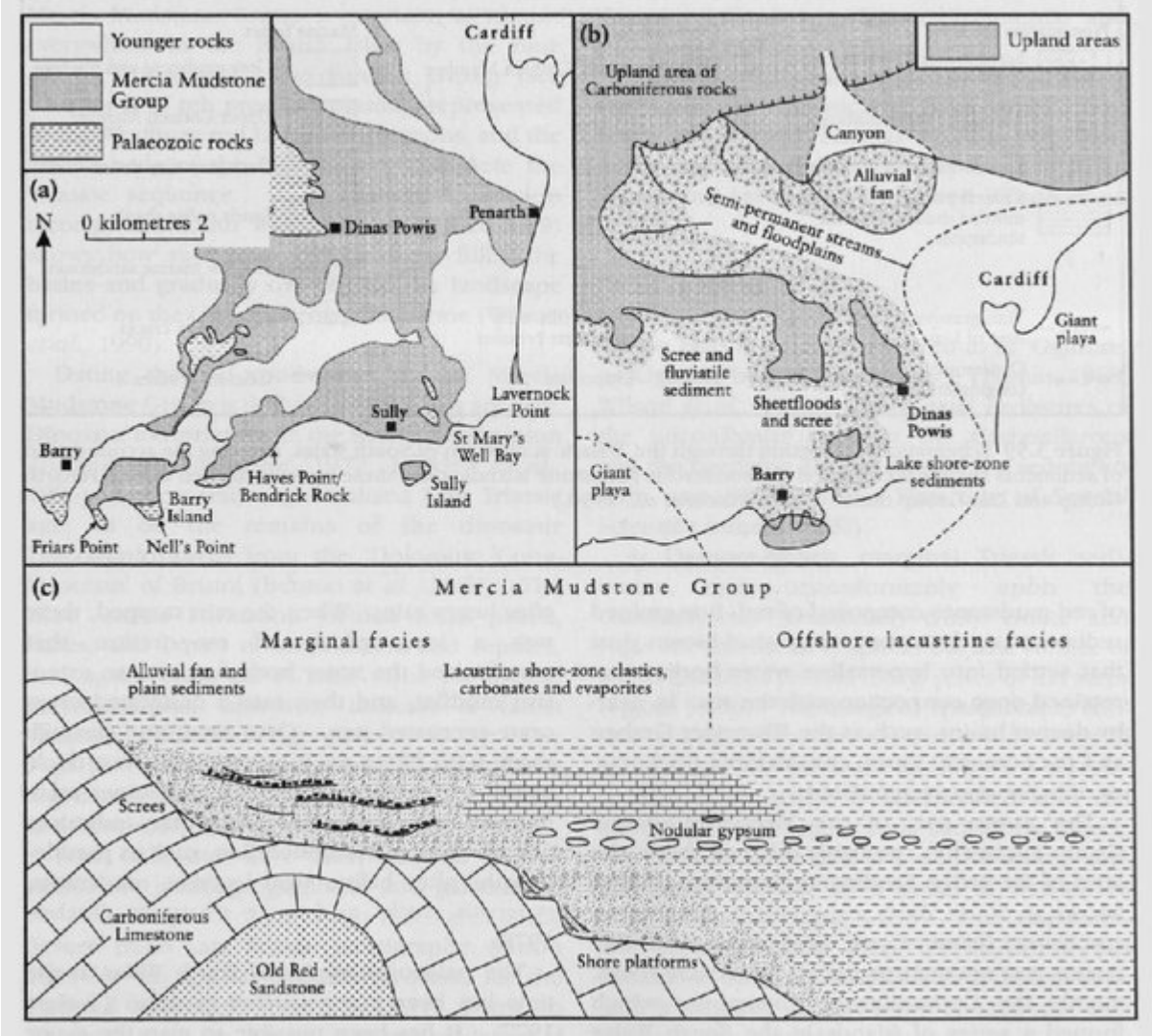
Sutton Flats, Mid Glamorgan

Barry Island, South Glamorgan

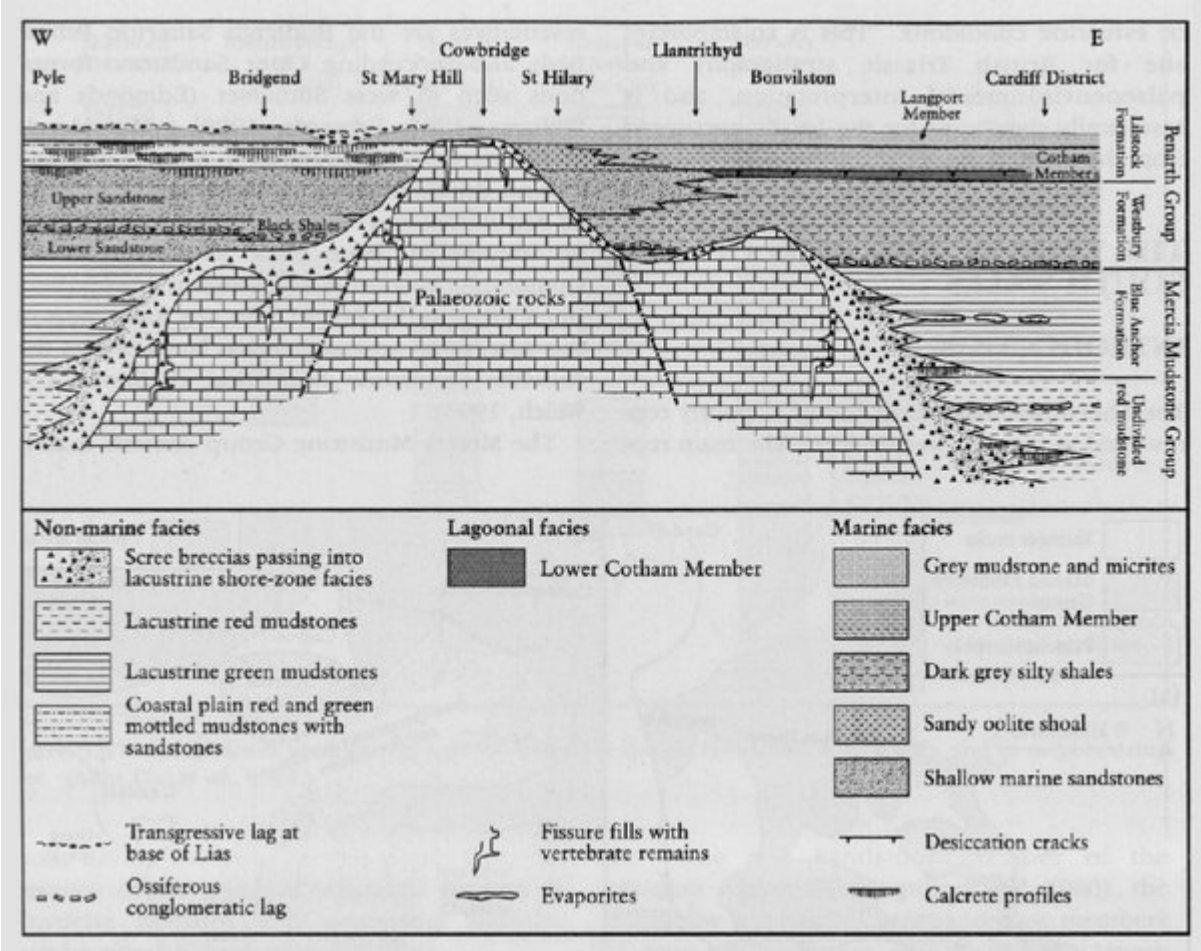
Hayes Point to Bendrick Rock, South Glamorgan

Sully Island, South Glamorgan

References



(Figure 3.58) The palaeogeography and sedimentary environments of South Wales in the Late Triassic Epoch: (a) sketch map showing the key localities, and the outcrop of major rock groups; (b) reconstructed palaeogeography of the area, showing uplands, a canyon and alluvial fan, major stream systems, shore-face platforms and screes, and the offshore giant playa; (c) cross-section, showing the shoreline features. All based on Tucker (1977, 1978).



(Figure 3.59) Schematic cross-section through the Triassic succession of South Wales, showing the accumulation of sediments against the uplifted Carboniferous Limestone islands, until these were ovelapped during Penarth Group and Lias Group times. (After Wilson et al., 1990.)