
The Triassic red beds of the Central Midlands

Introduction

Triassic rocks crop out extensively in the central English Midlands and thick successions accumulated in a number of deep basins. The Triassic strata generally rest unconformably on Carboniferous or Permian sediments. Rapid subsidence in fault-bounded basins in the north and north-west of the region led to the accumulation of thick sequences, while the southern and south-eastern areas, close to the London Platform, were more stable, and successions are thinner (Warrington *et al.*, 1980, pp. 35–7). The sequence of formations comprising the Sherwood Sandstone and the Mercia Mudstone groups represents the upward transition from continental fluvial to deltaic and littoral marine deposits in the former, and to playa and hypersaline epeiric sea environments in the latter (Wills, 1910, 1935, 1970a; Warrington, 1970a; Warrington and Ivimey-Cook, 1992).

As elsewhere, the Permo-Triassic boundary cannot be located objectively in the Central Midlands area. The lowest presumed Triassic units (Figure 3.49), resting unconformably on presumed Permian clastic sediments, are the conglomeratic lower member of the Cannock Chase Formation in Staffordshire and the Kidderminster Formation in the West Midlands and in Hereford and Worcester. These units, both formerly called the 'Bunter Pebble Beds', are present only in the western and northern parts of the district. They contain two types of rudaceous sediment, either separately or intermixed:

1. Breccias with clasts of fairly local origin, found in the western parts of the outcrop area, and interpreted as gravel fans at the mouths of wadis that discharged from mountainous areas bordering the basins;
2. Conglomerates with large, well-rounded pebbles transported a long distance (perhaps from southern England or the Armorican Massif of northern France) by powerful river systems (Wills, 1935, 1948; Campbell Smith, 1963).

The latter facies shares characters with the Budleigh Salterton Pebble Beds of Devon, with which the Midlands units may correlate. The pebbly conglomeratic facies occurs mainly in the lower parts of these units, and diminishes upwards. Study of palaeocurrents in the pebbly facies throughout the Central Midlands region and the Cheshire Basin allowed Wills (1948) to reconstruct the patterns of a number of major river systems in the Lower Triassic Series (Figure 3.50). The link to Devon and northern France is confirmed by detailed study of the provenance of the included clasts (Campbell Smith, 1963).

The disappearance of rounded extraclasts marks the poorly defined, and probably dia-chronous, base of the Wildmoor Sandstone Formation (Figure 3.49), formerly the 'Bunter Upper Mottled Sandstone', and equivalent perhaps to the upper member of the Cannock Chase Formation. Fossils occur sporadically in the Kidderminster and Wildmoor Sandstone formations: invertebrate trace fossils (Wills, 1970b), a perleidid fish (White, 1950), and the crustacean *Euestheria*, none of which provides evidence for age, although these fossils do not contradict the assumed Early Triassic age assigned to these units (Warrington *et al.*, 1980, p. 38).

A further sandstone unit, termed the 'Bromsgrove Sandstone Formation', formerly the 'Keuper Sandstone', rests unconformably on these formations south of Birmingham (Figure 3.49). This unit is marked by the reappearance of breccias and conglomerates in its lower half, and the incoming of fresh perthite feldspar suggests a renewal of tectonic activity and a rejuvenation of river systems. The Bromsgrove Sandstone Formation displays fining-upwards fluvial cycles. In the lower parts of the formation, the sediments display features that indicate deposition by braided or low-sinuosity rivers, whereas higher sequences suggest deposition in more mature, meandering river channel and floodplain complexes (Warrington, 1970a; Wills, 1970a, 1976).

The junction between the Sherwood Sandstone Group and the Mercia Mudstone Group in this region varies from relatively sharp to gradational. The gradational case is most common, and results from a gradual elimination of sandy units in the Bromsgrove Sandstone Formation as it grades upwards into a sequence dominated by mudstones. The Bromsgrove Sandstone Formation includes three members (Old *et al.*, 1991): the Burcot Member (lowest), the Finstall

Member (middle: formerly called the 'Building Stones'), and the Sugarbrook Member (highest; part of the former Waterstones'). The Bromsgrove Sandstone Formation has yielded diverse fossil assemblages, including plant remains (ferns and conifers), the annelid *Spirorbis* (Ball, 1980), bivalves, scorpions, branchiopod crustaceans, fishes, amphibians, and reptiles (Wills, 1910, 1947; Walker, 1969; Benton *et al.*, 1994). These fossils mainly come from the Finstall Member, with some from the Sugarbrook Member; the Burcot Member is practically unfossiliferous. Miospore assemblages have also been found at several localities (Clarke, 1965a; Warrington, 1970a, 1974a; Warrington *et al.*, 1980), and these indicate an Anisian age for the Bromsgrove Sandstone Formation. Earlier studies of the tetrapods led to suggestions of a Ladinian age, but an Anisian age is now preferred (Benton *et al.*, 1994).

The Mercia Mudstone Group in the northern and eastern parts of this region has been revised stratigraphically by correlation with Elliott's (1961) divisions of the Nottinghamshire region, as revised by Charsley *et al.* (1990). In western and southern parts of the region, an alternative stratigraphy has been established (Figure 3.49); Old *et al.*, 1987; Worssam and Old, 1988; Barclay *et al.*, 1997; Powell *et al.*, 2000). Lower parts of the mudstone succession include some sulphates and, locally, halite, while the upper parts lack halite, but include locally important sulphate deposits. These two sequences are separated by a distinctive and widespread unit, the Arden Sandstone Formation, of Carnian age, present in Worcestershire, Warwickshire, and Gloucestershire, and which correlates with comparable lithostratigraphical units of that age in Leicestershire, the Bristol region, Somerset, and Devon (Warrington *et al.*, 1980). The Blue Anchor Formation, at the top of the Mercia Mudstone Group, is recognizable throughout the region, lying below the Penarth Group, which is succeeded by the Lias.

Six GCR sites have been selected to represent the Triassic rocks of the Central Midlands area: Hulme Quarry and Brocton Quarry in the Stafford Basin to illustrate different sedimentological aspects of the Cannock Chase Formation; Wollaston Ridge to show the Kidderminster Formation; Claverley Road Cutting to show the Wildmoor Sandstone Formation; Burcot to show the Wildmoor Sandstone and the Bromsgrove Sandstone formations; and Shrewley to show the Mercia Mudstone Group mudstones and the Arden Sandstone Formation.

[Hulme Quarry Cannock Chase, Staffordshire](#)

[Brocton Quarry Cannock Chase, Staffordshire](#)

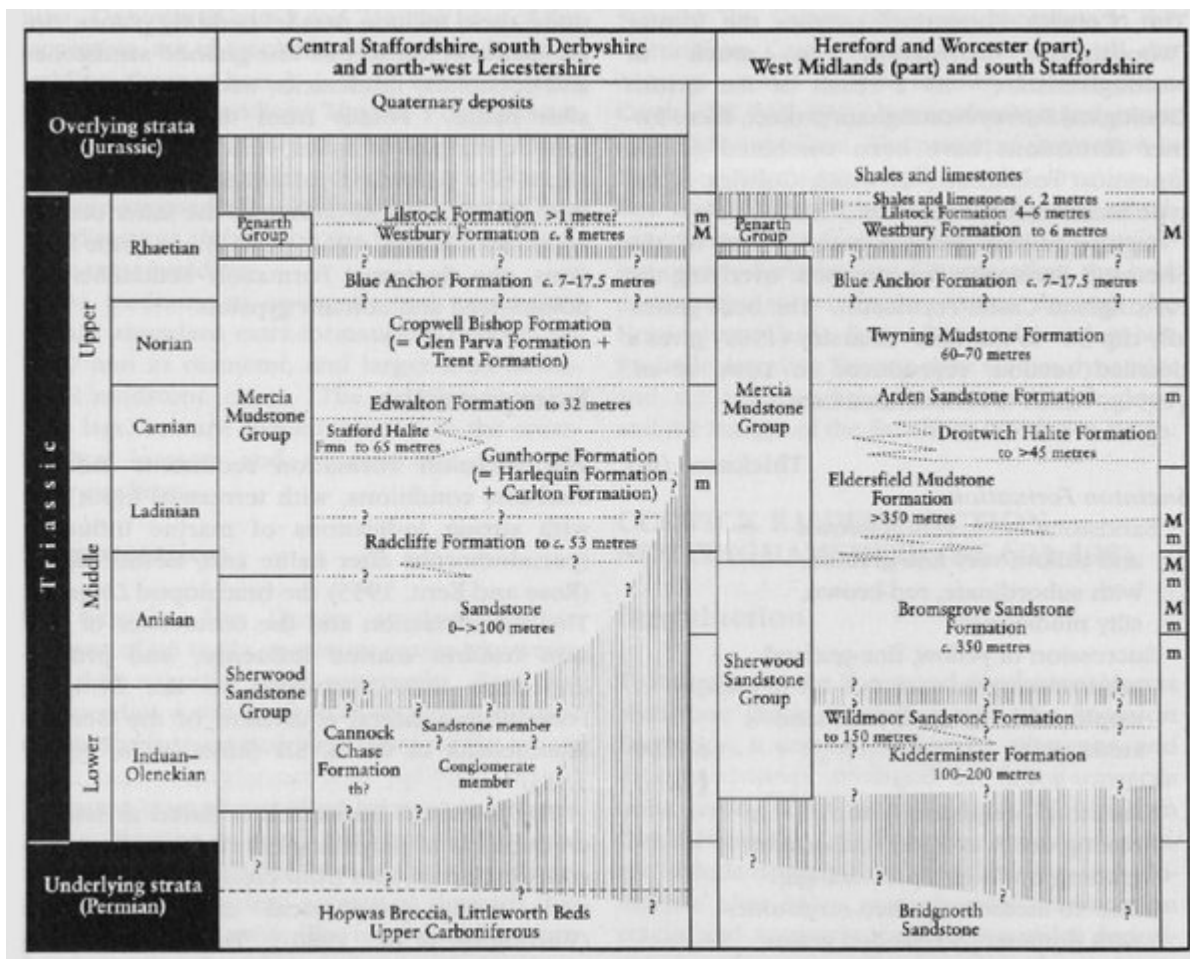
[Wollaston Ridge Quarry Staffordshire](#)

[Claverley Road Cutting, Shropshire](#)

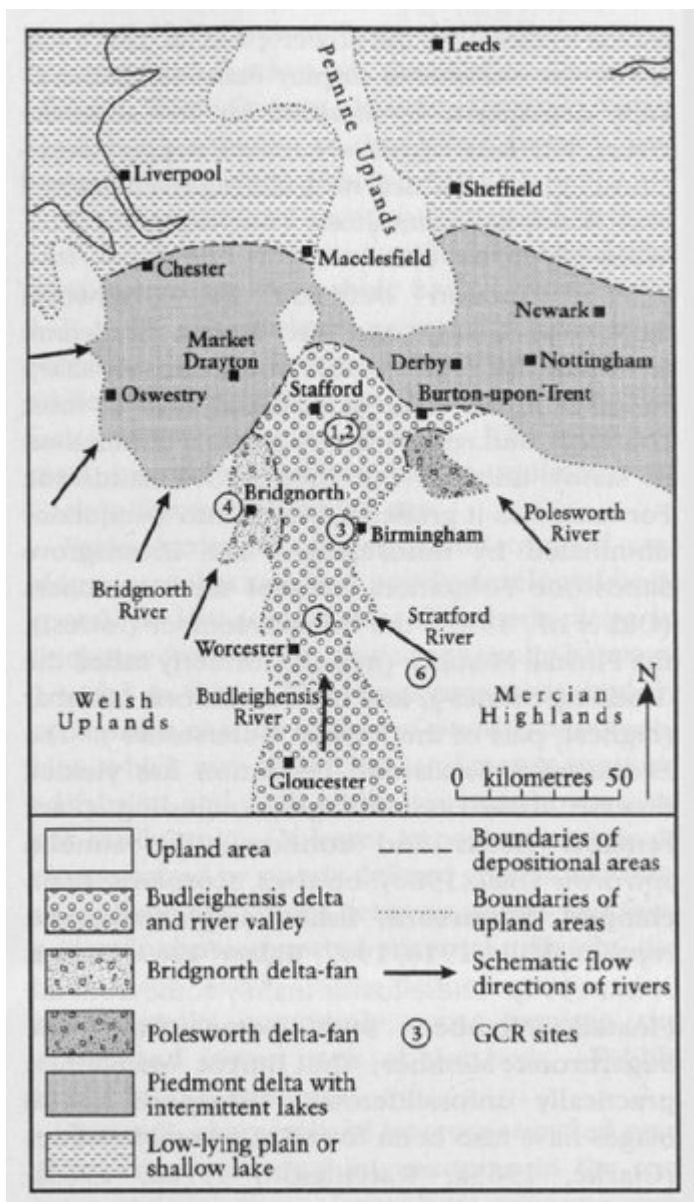
[Burcot, Hereford and Worcester](#)

[Shrewley, Warwickshire](#)

[References](#)



(Figure 3.49) Stratigraphical columns for the Triassic successions of the northern and southern Central Midlands regions of England. M, macrofossils; m, microfossils. (After Warrington et al., 1980, Charsley et al., 1990 and Barclay et al., 1997.)



(Figure 3.50) Early Triassic palaeogeography of Central England, showing postulated major river systems, based on palaeocurrent measurements and studies of clast provenance. 1, Hulme Quarry; 2, Brockton Quarry; 3, Wollaston Ridge; 4, Claverley Road Cutting; 5, Burcot; 6, Shrewley (After Wills, 1948.)