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# The Triassic red beds of Devon

## Introduction

The Triassic strata of Devon are seen in continuity with the Permian succession in the coastal exposures that extend, almost unbroken, from Tor Bay in the west to Pinhay Bay in the east. Some of the units that crop out in the west have been dated tentatively as Permian in age, by lithostratigraphical correlation with more securely dated units in the Crediton–Exeter area (see Chapter 2). The sequence and dating of the Devon Triassic succession, and correlation with units in the English Midlands, is relatively more straightforward above the Budleigh Salterton Pebble Beds, and Mid and Late Triassic ages have been assigned to units above that level.

The first stratigraphical attempts were by Ussher (1875, 1876), who divided the Devon coast red-bed succession into five lithostratigraphical units (Figure 3.70), a scheme that continued in use until the 1970s. Laming (1966, 1968) and Henson (1970, 1972, 1973) introduced major revisions to this scheme, and formalized the terminology, providing the basis for the names adopted by Warrington *et al.* (1980, pp. 42–5; (Figure 3.70)).

The Budleigh Salterton Pebble Beds and Otter Sandstone Formation of Henson (1970) comprise the Sherwood Sandstone Group, and the overlying 'Upper Marls' are assigned to the Mercia Mudstone Group that presently comprises largely unnamed units, except for a thin sandstone unit, the Weston Mouth Sandstone Member, and, at the top, the Blue Anchor Formation. The Weston Mouth Sandstone Member is regarded as a correlative of the North Curry and Butcombe sandstone members of Somerset, and the Arden Sandstone Formation of the Midlands (see above).

The Permo-Triassic boundary cannot be recognized in Devon, but the problem of the boundary seems to have attracted more attention here than elsewhere. The Aylesbeare Mudstone Group (Smith *et al.*, 1974), comprising the Exmouth Mudstone and Sandstone and the Littleham Mudstone formations, is placed in the basal Triassic (Edwards and Scrivener, 1999); it is devoid of stratigraphically useful fossils.

The overlying Budleigh Salterton Pebble Beds contain fossiliferous clasts reworked from Ordovician and Devonian sources (Cocks, 1989, 1993). No contemporary fossils have been found, and this unit has been regarded as Triassic in age on the basis of lithological similarities to the 'Bunter Pebble Beds' of the Midlands. The similarities are indeed close, and a strong case has been made, by close comparison of clast types, that the Sherwood Sandstone Group pebble beds in Worcestershire, the West Midlands, and south Shropshire were all deposited in a major river system that flowed northwards from France and through southern England (Figure 3.50); see also (Figure 3.74)). An Early Triassic age for the Budleigh Salterton Pebble Beds has been widely accepted, although without definitive evidence.

The overlying Otter Sandstone Formation has produced a diverse assemblage of fossils, including remains of plants, insects, molluscs, fishes, amphibians, and reptiles (Walker, 1969; Milner *et al.*, 1990; Benton *et al.*, 1994), which indicate an Anisian age. Beds in the middle of the Mercia Mudstone Group of the Devon coast have yielded Carnian palynomorph assemblages (Warrington, 1971), and the Blue Anchor Formation, at the top of that group, has yielded Rhaetian palynomorphs (Warrington, 1971; Stevenson and Warrington, 1971; Orbell, 1973). Similar Carnian and Rhaetian palynomorphs have also been recorded from the nearby Lyme Regis borehole (Warrington, 1997a).

Despite the problems in dating the succession, the Triassic rocks of the south Devon coast appear in spectacular exposures that are of considerable palaeogeographical and sedimentological importance, and two have been selected as GCR sites: Budleigh Salterton for the spectacular pebble beds, and Ladram Bay to Sidmouth for the Otter Sandstone Formation, both now part of the Dorset and East Devon Coast World Heritage site, declared in 2001.

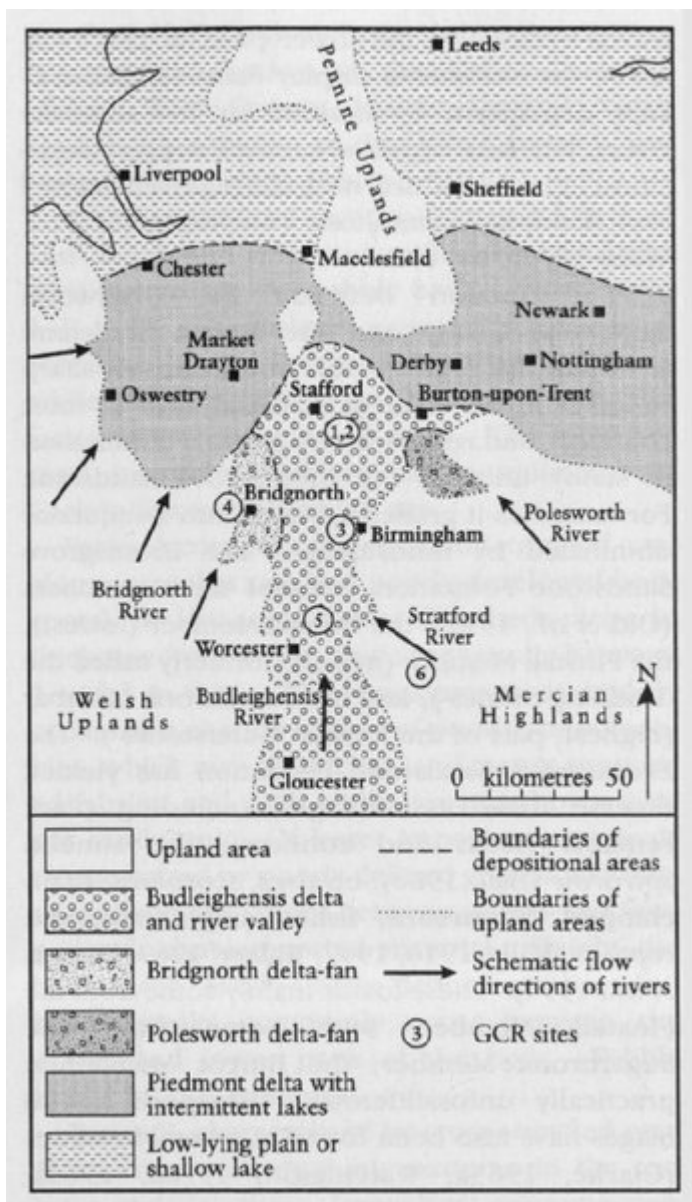
[Budleigh Salterton, Devon](#)

[Ladram Bay to Sidmouth, Devon](#)

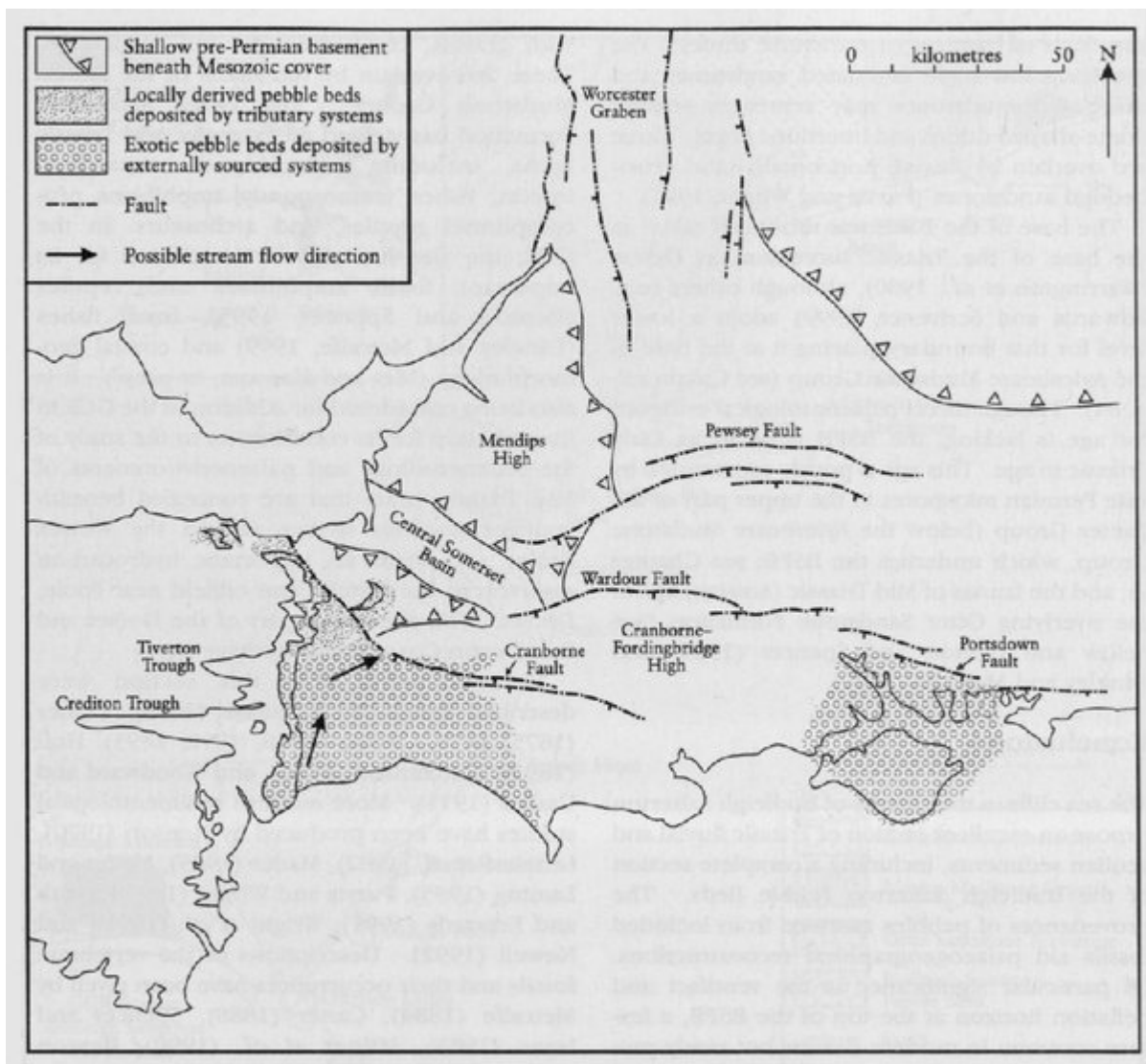
## [References](#)

			Classical terminology (Ussher, 1875, 1876)	Current terminology		
Overlying strata			Lias	Cretaceous		
Triassic	Upper	Rhaetian	Rhaetic	Penarth Group	Jurassic Shales and limestones Limestones and shales c. 2.4 metres Lilstock Fmn to 9 metres Westbury Formation c. 10 metres Blue Anchor Fmn c. 24 metres ? ? ?	M m
		Norian	Upper Marls	Mercia Mudstone Group	Mudstone th? (> 126 metres)	m
		Carnian			Weston Mouth Sandstone Member	m
	Middle	Ladinian	Upper Sandstones	Sherwood Sandstone Group	Mudstone to 175 metres	m
		Anisian			Otter Sandstone Formation 210 metres	M
	Lower	Induan-Olenekian	Conglomerates and Pebble Beds		Budleigh Salterton Pebble Beds 26-32 metres ? ? ? ? ? ? ? ?	
			Lower Marls	Aylesbeare Mudstone Group	Littleham Mudstone Formation to 275 metres Exmouth Mst and Sst Fmn to 255 metres ? ? ? ?	
Underlying strata (Permian)			Lower Sandstone and Breccias	Exeter Group		

(Figure 3.70) Stratigraphical columns for the Triassic succession of Devon, showing the current, and the older nomenclature. M = macrofossils; m = microfossils. Based on Ussher (1875, 1876), Warrington et al. (1980), and Edwards and Scrivener (1999).



(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.)



(Figure 3.74) Palaeogeography of the south of England during the deposition of the Budleigh Salterton Pebble Beds, showing the location of outcrops, and concealed occurrences detected by boreholes in Dorset and in the Hampshire Basin. Major palaeocurrent flow directions are indicated. Abbreviations: CF, Cranborne Fault; CFH, Cranborne-Fordingbridge High; CSB, Central Somerset Basin; MH, Mendips High; PF, Pewsey Fault; PDF, Portsdown Fault; WF, Wardour Fault; WG, Worcester Graben. (After Smith and Edwards, 1991.)