Tenby Introduction

The Carboniferous System 363 to 290Ma, was named to include coal-bearing (carbonaceous) strata in Britain.

By the end of the preceding Devonian Period the Caledonian Mountains had been eroded to low levels and the Old Red Sandstone (ORS) Continent was invaded by the very warm, shallow-shelf seas of the Rheic Ocean. This marine transgression, when Britain was astride the equator, led to the deposition of shallow-water tropical carbonates – the Carboniferous Limestone. Later the shallow seas were invaded by deltas formed by rivers flowing in from adjacent high ground to the north. The Millstone Grits were created from these sandstones. Finally, the climate changed and became more humid and the deltas became the habitats for swamp and tropical rain forest flora.

Rapidly changing deltas and frequent changes in sea level meant repeated inundations of the swamp areas. The burial and decay of the lush vegetation led to the eventual formation of peat which lithified as the coal of the Coal Measures.

During the Carboniferous marine life continued to evolve. Goniatites are useful zone fossils. Corals and brachiopods were common in the early limestones.

In the Coal Measures the rocks are almost without marine fossils and show every sign of being the deposits of freshwater or brackish deltas and swamps, here non-marine bivalves are useful for dating. Giant land plants evolved - Lycopods the oldest extant vascular plant division and tree ferns. Giant flying insects were common. The great burst of plant evolution world-wide took carbon dioxide out of the atmosphere. The reduction of greenhouse gas caused global cooling and a major glaciation over Gondwanaland, positioned around the South Pole at the end of the Carboniferous.

Carboniferous sequences show evidence of repeated cyclotherms – complex alternating stratigraphic sequences of marine and non-marine sediments. The typical sequence is limestone – shale – siltstone – sandstone – seat-earth – coal. The sequence was then repeated.

Plate tectonics and palaeogeography.

The Rheic Ocean closed during the Devonian and Carboniferous Periods in several phases as a result of the Variscan Orogeny. It also resulted in the formation of major folds and faulting.

By the end of the Carboniferous Britain lay within the arid heart of Pangaea.

Carboniferous Stratigraphy.

Series

Westphalian Coal Measures - Spores are useful for dating.

Namurian Millstone Grit

Dinantian Carboniferous Limestone - Defined by cycles of sedimentation caused by changes in sea level and divided into six stages, with marine transgression defining the base and regression marking the top.

The Carboniferous in Pembrokeshire.

Carboniferous Limestone. Up to 800m of Carboniferous Limestone occur following on from the Upper ORS without a break. The base of the sequence and junction with the ORS is to be seen at Skrinkle Haven west of Tenby. All the Dinantian cycles can be identified.

Millstone Grit. Up to 800m of deltaic sandstones created by the deposition of sediments from rivers that flowed off St. George's Land to the north.

Coal Measures. The Coal Measures show strong deformation. In Pembrokeshire the Variscan orogeny created complex folds and faults. The compression and thrusting creating these structures came from the south.

Stratigraphy

Carboniferous

Westphalian Coal Measures Saundersfoot Ladies Cave anticline. Variscan foldig and faulting

Westphalian Coal Measures Amroth 'slump sheet', Lady Frolic coal seam

Namurian Marros Group Tenby North Beach Telpyn Point Sandstone

Dinantian Carboniferous Pembroke Limestone Group Tenby South Beach

Caswell Bay Oolite

High Tor Limestone and Caswell Bay Mudstone

Hunts Bay Oolite Formation

Lower Carboniferous Avon Group West Angle Bay Variscan folding and faulting

Lower Carboniferous Limestone Avon Group (previously Lower Limestone Shales) Skrinkle Haven transitional contact with Old Red Sandstone

Devonian Old Red Sandstone

Upper ORS Skrinkle Sandstone Group Skrinkle Haven

Lower ORS Ridgeway Conglomerate Formation Great Furzenip

Lower ORS Freshwater West Formation Manorbier including Castlepoint Limestone, Townsend Tuff

Lower ORS Moors Cliff Formation Manorbier including Preists Nose Tuff

Lower ORS Castlepoint Limestone Freshwater West

Flimston Bay Fault cuts through strata seen at Freshwater West

Lower ORS Freshwater East Formation Freshwater West

Unconformity Freshwater West

Silurian (Wenlock) Limestone Freshwater West

Ordovician (Llanvirn) Shales Freshwater West