

1. Devonian/Carboniferous (Variscan), South Devon
2. Devonian/Carboniferous (Variscan), North Devon
3. Variscan Igneous Rocks
4. Permian and Triassic Rocks of East Devon
5. Cretaceous/Tertiary Rocks
6. Quaternary

2.4. Devonian/Carboniferous (Variscan), South Devon

The Variscan Orogeny or mountain building period which caused the severe folding and deformation of the Devonian and Carboniferous rocks in South West England resulted from gradual encroachment and collision of a continent drifting from the south. The effects of this were progressive south to north during the two geological periods. The Devonian rocks of South Devon had already been severely deformed and compressed at the same time as the later Carboniferous rocks in a marine sedimentary basin to the north were still being formed.

The mid to late Devonian limestones of South Devon are well seen in three active quarries, Linhay Hill, Stoneycombe and Moorcroft:

2.4.1 Linhay Hill Quarry

General quarry view showing the three working faces.

Photo LI 0

From SX 7697 7651

Elevation 138m AOD

Facing ESE



Linhay Hill Quarry is at Ashburton at the south-eastern edge of the Dartmoor National Park, the core of which is occupied by the Dartmoor Granite. Away from the edge of the moorland however, in the vicinity of Ashburton, the rocks are largely sedimentary, of Devonian and Carboniferous age, older than the Dartmoor Granite and constituting the 'country rock' into which the granite was intruded. The margin of the granite is about 3 km to the north west of the quarry

The limestone at Linhay Hill Quarry is the Chercombe Bridge Limestone, mid to late Devonian in age, about 380 to 360 million years old. The photo is an enlargement of the area shown on the Front Cover of the Quarry Report and shows the three working faces. The most immediate aspect of the geology is the medium to dark-grey well-bedded limestone sequence with a very consistent dip direction at around 28° to the south east. To the left side of the dumper and excavator can be seen a zone of very light coloured calcite which has replaced the limestone and is a prominent feature in the present working area.

The limestone sequence across the quarry totals about 250 metres thickness (measured at right angles to the bedding) and generally speaking there is little variation in limestone type throughout. The limestone matrix is generally fine grained lime-mud in which larger particles such as shell or coral fragments are embedded in varying degrees of abundance.

Linhay Hill Quarry

Coral and brachiopod limestone.

Photos LI 5 and 6

At SX 7733 7166, top NE corner of quarry

Elevation 130m AOD



The mid to late Devonian limestone is fossiliferous throughout with abundant corals, both solitary and colonial, stromatoporoids (coral-like skeletons) and brachiopods. The photos show typical examples. These fossils are well seen in the solution weathered limestone surface, especially in large loose blocks abundant at the north-east corner of the quarry.

The limestone appears to have formed in a shallow tropical sea closely similar to many coral-sea coastal environments in the Caribbean or Indian Ocean areas today where localised shallow islands with fringing coral shelves suddenly fall away into very deep basin areas. The area is believed to have been situated close to the equator in Devonian times.

The rock was formerly quarried in the area for monumental stone and was known as 'Ashburton Marble'. Polished examples can be seen occasionally in churches and other buildings throughout Devon.

An example of the Linhay Hill coral limestone is also illustrated as photo 6 on the front cover of this report.

Linhay Hill Quarry

Bickington Thrust shown T – T – T?

Photo LI 12

From SX 7672 7119

Elevation 95 m AOD.

Facing NE



The limestone deposit at Linhay Hill is cut off at its base by a major thrust plane believed to be the south-westerly extension of the Bickington Thrust. The thrust zone can be seen in the north side face of the main ramp from the workshop area to the quarry floor. The edge of the limestone is marked T-T on the photo, extending beyond across unexposed ground probably along the line marked T?. The Kate Brook Slate Formation, younger than the limestone, underlies the thrust at the left hand half of the photo.

The Bickington Thrust is one of numerous thrust faults present in the Devonian rocks of south Devon resulting from the south to north compression of the Variscan continental collision.

A complex and irregular contact is seen, apparently dipping at an angle slightly steeper (estimated about 42°) than the normal dip of the limestone beds in the quarry. At this point the apparent strike of the thrust plane appears to be about NNE, slightly oblique to the normal strike of the bedding in the quarry.

The limestones above the thrust and the slates below the thrust are much disturbed, as might be expected, because displacement on the thrust plane may have been on a scale of many kilometres. Most of the movement probably took place in the weaker slates and there are rafts of non-carbonate rock caught up in the upper few metres of the slates. The overlying limestone is much broken and calcite veined and shows little trace of bedding or other original structure in its lowest 20 metres thickness (estimated). Not until the bottom of the ramp at the quarry floor is reached (seen towards the right hand side of the photo) are definite indications of bedding visible and even so the limestone continues to be heavily calcite veined.

2.4.2 Stoneycombe Quarry

General quarry view showing overall pink coloration of the deposit.

Photo ST 02a

From SX 8603 6683

Facing NE



Stoneycombe Quarry is about 6 km northwest of Torquay near Kingskerswell. In this area the rocks are largely sedimentary and Devonian limestones are relatively abundant. The photo shows the overall pink colour in the quarry which is a combination of the body colour of the limestone (see photo below) and red fracture surfaces.

The limestone quarried at Stoneycombe is in the East Ogdell Limestone Group which is mid Devonian in age, about 380 to 370 million years old. Most of the limestone is much fractured but bedding is difficult to see. However, outside the main quarried area some thinly bedded and coarse grained limestones, locally folded and in places overturned, indicate a general dip to the north. The limestone outcrop is much disrupted by faulting.

The limestone deposit is part of a major thrust slice of East Ogdell Limestone shown by deep exploratory drilling in the quarry to overly younger green and purple slates of the Whiteway Group of Devonian/Carboniferous age. Volcanic tuff is known from boreholes to occur adjacent to the limestone to the south of the quarry. The limestone outcrop is flanked and unconformably overlain by red beds of the Permian Watcombe Breccia which is the likely source of the red staining on the fracture surfaces.

Stoneycombe Quarry

Examples of structures seen in Core Samples

Photo ST 17b



Detail examples of intensely altered, veined, deformed and variously coloured limestone in core samples.

The polished sections of core illustrated above demonstrate a number of post depositional alteration structures that include both brittle and plastic deformation in the form of micro folding and faulting, stylolites (crenulated solution features) that both post date (cut across) and pre-date (are cut by) other features. Other examples include, veining, open voids, stoping and the re-deposition of material.

The limestone at Stoneycombe frequently has the appearance of a marble having been much altered by heat and pressure of deep burial. However, recognisable fossil corals and stromatoporoids are frequently seen so the original sedimentary fabric has not been completely metamorphosed and the rock is therefore not a true marble. It has however been used as polished ornamental stone, but with mixed success largely because of the abundant fracturing.

An example of the Stoneycombe limestone is also illustrated as photo 1 on the front cover of this report.

2.4.3 Moorcroft Quarry

General view of the quarry and outcrop of Limestone Formation

Photo MO 0

Aerial Photo

Facing West



The aerial view is westwards along the east-west strike of the mid to late Devonian Plymouth Limestone Formation, the beds generally dipping southwards. In the middle background are the old limestone workings of the Plymstock cement works, closed in recent years. In the distance, across the Plym Estuary, is the City of Plymouth and the limestones of Plymouth Hoe facing the sea in Plymouth Sound

The present active area at Moorcroft is the large excavation in the foreground, known as Pit 4, with the processing plant area and old workings used for water recirculation behind. The pale to medium grey limestones are about 300m thick, dipping consistently southwards at angles generally between 15⁰ and 25⁰, occasionally steeper where affected by faulting. The northern limit of the workings is bounded by a major thrust fault dipping southwards at about 25⁰ with volcanic tuffs and late Devonian shales and slates beneath.