



A WALK AROUND OGDEN WATER, CALDERDALE, TO LOOK AT THE ROCKS AND LANDSCAPES Grid Reference SE 054 318

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Bedding planes and joints in the Rough Rock quarries at Ogden Kirk



Plant fossils are seen on the fallen blocks below the quarry face

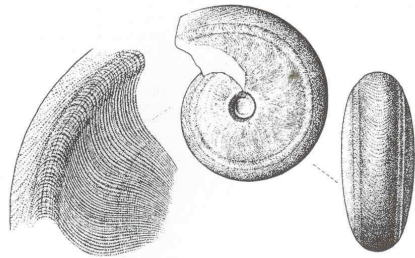
The rocks of the Ogden Clough area are **Upper Carboniferous** (Marsdenian) in age, so they are about 310 million years old.

These rocks were laid down in **deltas** on the edge of a large continent, with mountains to the north and south. Sands and muds were deposited by rivers in shallow water. Because the continent was close to the equator, the climate was warm and wet so that tropical rain forest flourished. Dead plant material became trapped in stagnant swamps between river channels. Over geological time it was buried by muds and sands as the rivers in the delta changed position and building up more deposits. The water, oxygen and hydrogen were driven out of the plant remains, leaving only the carbon in coal seams. A very thin coal seam, only a few centimetres thick, exists in Ogden Clough, but is not easy to find.

After the sediments were formed close to sea-level, they were buried by hundreds of metres of sediment and compressed. As the sea water moved upwards it carried minerals which cemented the sand and mud grains together to make **sandstones** and **mudstones**.

These rocks, particularly the mudstones, contain fossils, of which the most important are **goniatites**. There is a layer of mudstone below the Rough Rock which contains goniatites, as well as other fossils, such as shells and microfossils. It is exposed in Great Scar, in the lower section of Ogden Clough, which is inaccessible at present.

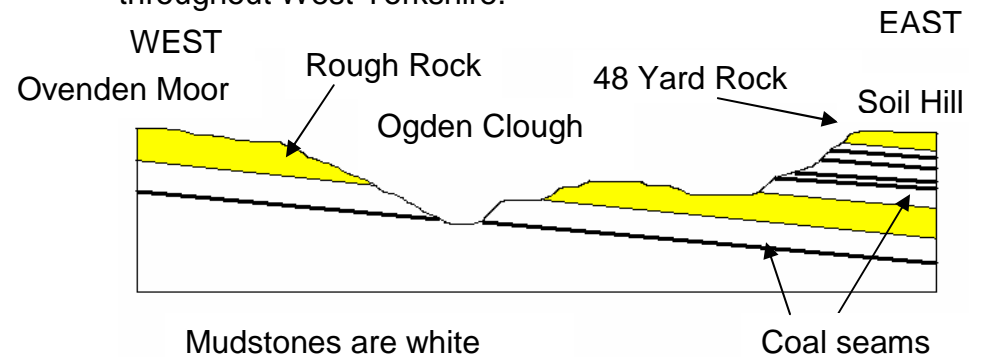
Goniatite



Goniatite - Reticuloceras bilingue x 1 1/2

The stream in Ogden Clough has eroded down into mudstone layers and in one part of the clough has a formation of **tufa** along banks. The tufa is thought to be precipitated from calcium carbonate in the ground water.

Most of Ovenden Moor is underlain by a sandstone called the **Rough Rock**, which has been quarried in Ogden Kirk quarries above Ogden Clough. The Rough Rock is a thick bed of sandstone which forms many gently sloping plateaux in the Huddersfield and Halifax areas, including the slope on which the town of Halifax stands. It can be worked into an excellent building stone so has been widely quarried throughout West Yorkshire.



Cross section to show the geology of the Ogden Clough area

The Rough Rock sandstone is more resistant and forms the upland moors, while the mudstones are less resistant and are weathered and eroded more easily, so are exposed in the cloughs. This pattern of erosion on the sandstones and mudstones is common and gives West Yorkshire its characteristic landscapes of flatter moorlands formed by sandstones and steeper slopes formed by mudstones.