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A WALK AROUND COW AND CALF ROCKS AND HANGINGSTONES QUARRY, ILKLEY

Grid Reference SE 131 467

The Cow and Calf rocks

The rocks of the Ilkley area are **Upper Carboniferous** (Kinderscoutian), so they are about 320 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 built up more deposits. The water, oxygen and hydrogen were driven out of the plant remains, leaving only the carbon in **coal seams**.

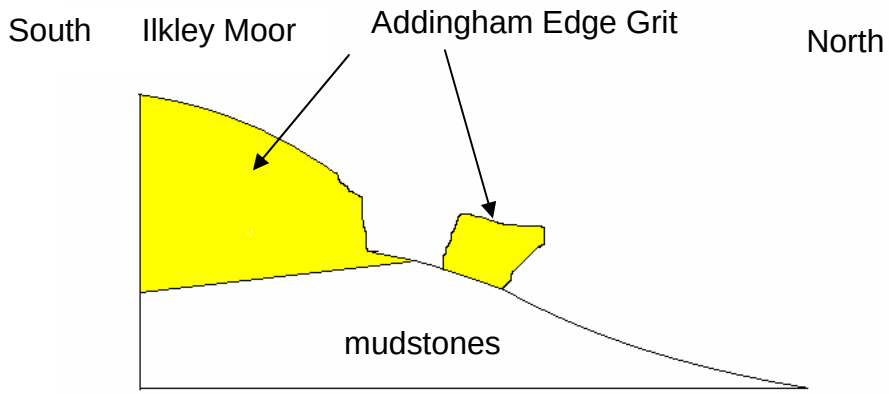
After the sediments were formed close to sea-level, they were buried by hundreds of metres of sediment and **compressed**. As the sea water was squeezed out, it carried minerals which **cemented** the sand and mud grains together to make rocks called **sandstones** and **mudstones** (shales).

The rocks were tilted into a large north-south trending **fold**, called the **Pennine anticline**, shortly after they were formed. However, the rocks in the Skipton area were also folded into east-west trending folds, probably because of the effect of older rocks of the Yorkshire Dales, which formed a resistant block bounded by the Craven Faults, which lie only a short distance north of Ilkley.

The sandstone forming the Cow and Calf Rocks is called the **Addingham Edge Grit**. Higher up on Ilkley Moor are other sandstone beds, such as the **High Moor Sandstone** and the **Doubler Stones Sandstone**, which were deposited after the Addingham Edge Grit and therefore lie above it. All the sandstone beds vary in thickness and probably represent flood deposits in the delta area. Between the sandstone beds lie beds of mudstone (shales) which were deposited in marshes or swamps between the rivers on the delta. The pale grey mudstones sometimes contain fresh-water shells.

During the Carboniferous period the sea-level changed regularly, because of glaciations in the southern hemisphere. Therefore the delta was sometimes drowned by sea-water which meant that dark mudstones were deposited above the delta sediments. These marine bands contain marine **goniatite** and **bivalve fossils** which can be found in some local mudstones. Because this change in sea-level happened regularly there are many alternations of sandstone and mudstone in West Yorkshire's Carboniferous rocks.

Because of later plate movements, the rocks here have been **tilted** to the south at a gentle angle, which results in the steep northern slope of Ilkley Moor which overlooks the Wharfe valley.



<u>Cross section to show the geology of the Cow and Calf Rocks, Ilkley</u>
Sandstone is shown in yellow