

The rocks of the Marsden area are **Upper Carboniferous** (Marsdenian) in age, so they are about 300 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. There are a couple of very small coal seams a few centimetres thick in the Marsden area.

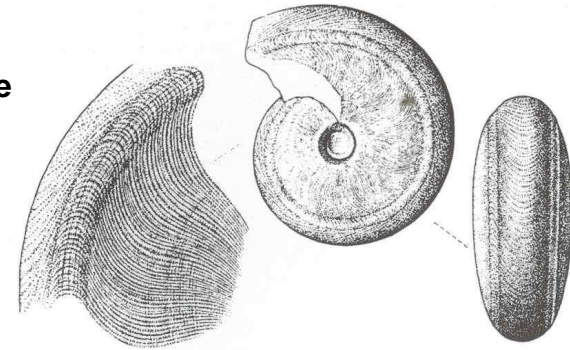
After the sediments were formed close to sea-level, they were buried by hundreds of metres of sediment and compressed. As the sea water moved upwards it carried minerals which cemented the sand and mud grains together to make rocks called sandstones and mudstones (shales).

The rocks were tilted into a large fold, called the Pennine anticline, shortly after they were formed. The rocks of the Marsden area tilt slightly which gives rise to the gentle benches made from the sandstones. The mudstones are less resistant and can be weathered easily unless they are protected by a layer of sandstone lying above.

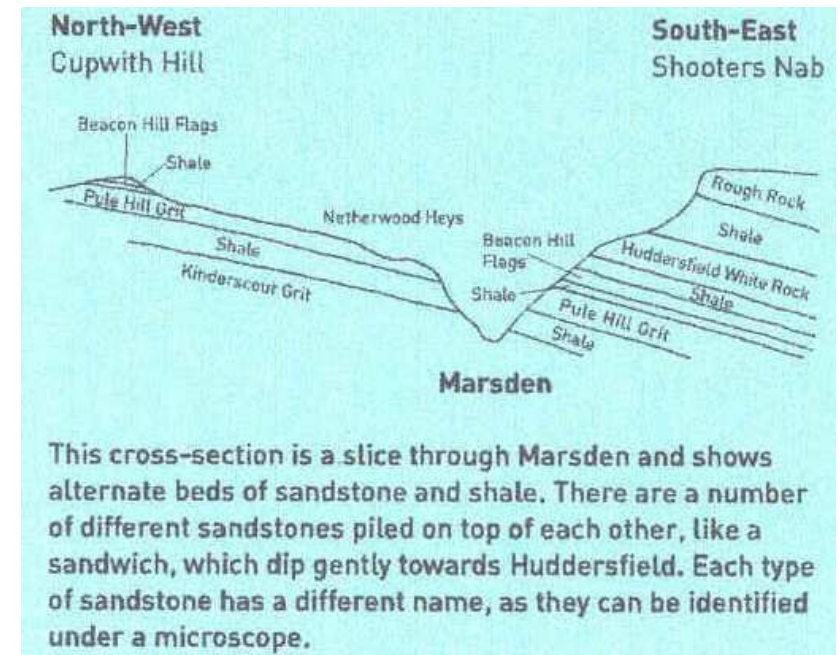
These rocks, particularly the mudstones, contain fossils, of which the most important are goniatites. The goniatites are used to correlate the rocks and much of the first scientific work was done in the 1920s in this area by W. S. Bisat. The fossil locality at the end of Mount Lane is of international

importance and has been designated by Natural England as a Site of Special Scientific Importance.

Goniatite



Goniatite - Reticuloceras bilingue x 1 1/2



Cross section to show the geology of the Upper Colne Valley