

August 15<sup>th</sup> 2017 Tuesday

## Anston Stones Woods, Rotherham, South Yorkshire

**August** saw a group of 10 of us meet with Tony Felski on a superb day at North Anston to visit the Magnesian limestone of the Permian Era deposited within the Zechstein Sea. The walk starts just south of the village and generally followed a dedicated path down the valley which showed many good and weathered exposures. Crossing the busy A57 we visited the quarry which supplied some of the stone for the Houses of Parliament (thus its demise!).

Tony showed us an area of faulting where a fault with slickenside was in evidence and which brought the quarry to its closure.

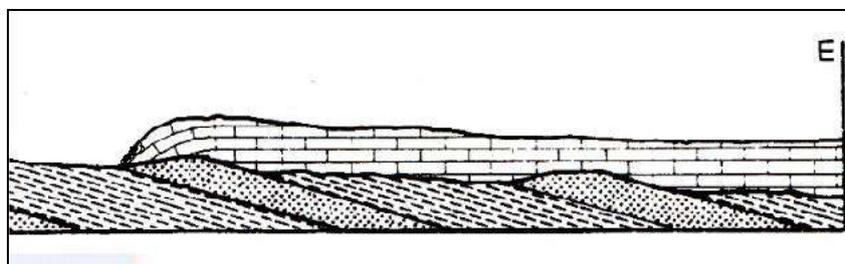
**Purpose of visit:** To observe the rocks, depositional and erosion features of The Cadeby Formation Magnesian Limestones of the Lower Permian.

**Geological Background:** The exposures we will see were deposited in the Permian some 255Ma ago.

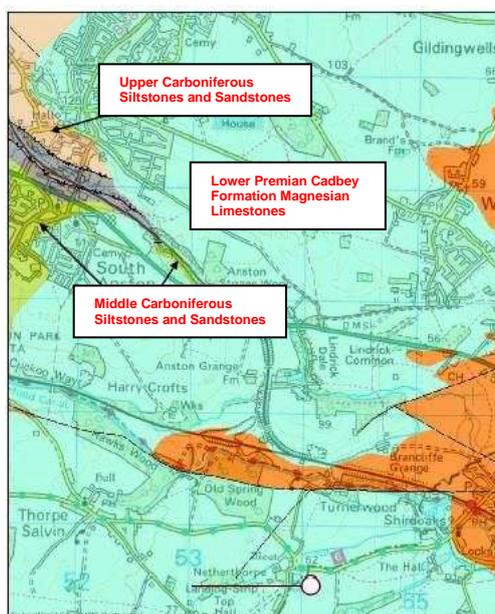
At the end of the Carboniferous about 290 Ma ago what would become the British Isles had moved from the Equator north to the sub tropics where the land was subject to dry and arid conditions, uplift and erosion for next 35Ma. The resulting landscape of desert and patches of bare rock was subsequently flooded by the Zechstein Sea to the east. This sea was essentially a landlocked sea with infrequent connections to and flooding from more open marine conditions to the north. The resultant evaporation, concentration, dilution and variation in size and chemistry of the Zechstein Sea created the Magnesium Limestone deposits that we will see. The Permian Magnesium Limestone stretches from North to South through the whole of Yorkshire and being a very erosion resistant rock forms a prominent ridge along which the Romans chose to build the Great North Road.

At the end of the last Ice Age 12000 years ago, melt waters passing through joints and bedding planes created subterranean caverns and cavities. As the glaciers to the north retreated rivers formed downcutting into the Permian and Carboniferous rocks below.

Anston Stones Wood was not used for large scale quarrying, but locally there were several very large quarries from where the stone for the rebuilding of the Houses of Parliament in 1840 was extracted. Unfortunately, some of this stone was not of the highest quality hence the need for its replacement during the present time.



Cross-section of the area (adapted from Scrutton & Powell 1996)





The valley was formed at the end of the last ice age about 12000 years ago when torrential rivers formed from melting ice to the north cut through the valley exposing the rocks and eroding out what now remains as rock shelters. The rock shelters could not provide dwellings for early man, but there was evidence of their use by humans as flints and other artefacts had been found in them.

The exposures to be seen represent the deposition of the limestone, dolomitization, reef formation, dissolution effects and small scale faulting.

At the first exposure bedding planes were found, the colour and texture noted, and the rock tested with acid. It did not fizz unlike the sample of limestone tested in the car park. Based on the reddish colour and the presence of ooids suggested that the rock was limey sandstone probably formed in a low energy sandy beach environment on the edge of the Zechstein Sea.



Typical features and subjects for discussion:

Depositional features, bedding planes and dissolution effects



Reef formations



Lindrick Dale Quarry

Parts of the Lindrick Dale quarry face were examined. The floor is a bedding plane which after taking a dip and strike was shown to dip at about 20° to the south east. In the eastern corner of the quarry the face had groups of parallel lines dipping at about 45° to the horizontal. These were identified as slickensides formed by small scale faulting with adjacent rock.



Effect of sea water chemistry on rock deposition and structure

Many of the exposures were featureless with no bedding planes or other structures evident. This was explained to be the remains of reefs which formed in shallow water at the edge of the sea. Because of the salinity of the sea animal life was scarce, but what life managed to survive formed into colonies of shellfish and microbial mats eventually forming the reefs.

### **Logistics**

Walking distance is about 6km mostly on well made up paths with gentle slopes. There is a short, but moderately steep climb to see one exposure. A small cave can be entered by groups of four persons at a time, it is a bit of a tight squeeze, so a good torch might be useful.

To see exposures in Lindrick Dale Quarry it is necessary to cross, and re cross on the return, the A57 trunk road. This road can be very busy so care must be taken.

### **SSSI Guide**

To learn more about the location go to the SSSI guide PDF on the 2017 ESCAPADES webpage and [click there](#).