

# Peak District Field Excursion, September 2019

## *From the bowels of the earth to the Garden of Eden*

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Limestones form the core of the Peak District and are the oldest visible rocks that lie on a deeply buried basement. The basement was submerged during early Carboniferous times about 350 million years ago. The Carboniferous sedimentation within the Pennine Basin which was bounded by the Southern Upland Massif to the north and the Wales-London Brabant Massif (St Georges Land) to the south. The typical sequence in this extensional system are marine carbonates followed by late extension post rift fluvial deltaic clastics.

Ref: Rocks & Scenery of the Peak District. Landmark Pub 2002 Trevor Ford.

### Rutland Arms Hotel, Bakewell



The Rutland Arms was built in 1804. It is claimed that Jane Austen stayed there in 1811 and she based Lambton in *Pride and Prejudice* on Bakewell. The Derbyshire town of Bakewell started as a Saxon settlement. It was called Beadeca's wella, which meant Beadeca's springs. In 1863 a railway was opened between Bakewell and Buxton but closed just over a century later in 1968. Today Bakewell is a flourishing little town sits on the River Wye, and is the only town in the Peak District National Park.

#### Trip objectives:

- Examine structural for evidence of Variscan/Hercynian NE/SW structural trends and local factors which may influence this trend
- Mineralisation in Derbyshire
- Perpendicular transect through a carbonate platform looking for evidence of climate change



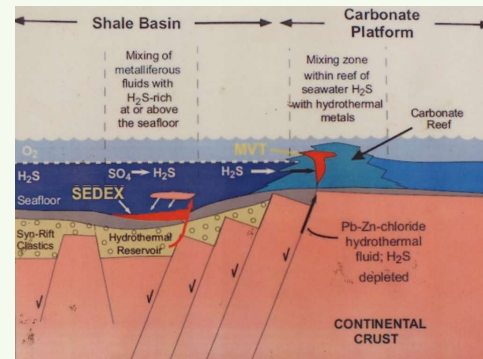
Sand box illustrating compression



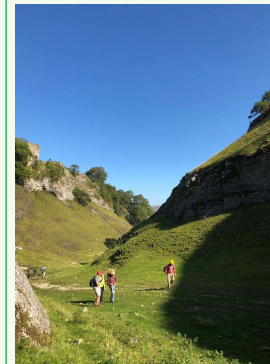
### Day 1 Ecton Mine and Monsal Dale

Ecton Copper mines once owned in the 18th Century by the Duke of Devonshire making huge profits to finance amongst other things the Crescent in Buxton. Their London residence was Burlington House!

- At the forefront of mining technology and innovation - for example the use of explosives and using early Boulton and Watt steam engine.
- The Peak District metalliferous minerals are mesothermic in origin created at moderate depths, pressure and temperature. Hydrothermal solutions circulating through sediments and rocks picked up minerals from the basin clays to the north. These hydrothermal solutions then penetrated the limestones under pressure via joints and faults. Minerals such as galena and sphalerite were deposited.
- Carboniferous volcanism – Upper Millers Dale include lavas Litton Mill - amygdaloidal olivine basalt



Examining pillow lava at Litton Mill. The hot lava flow entered the sea, and on contact with the sea the lava cooled and shattered almost instantly into fragments of various sizes. Explosions occurred when seawater was incorporated into the lava flow. The inner liquid parts of the lava flow congealed underwater into rounded blobs of solid lava called pillows. The result was a thick build of lava called flow foot breccia.



Cavedale – near Castleton



Top photo  
Columnar jointing Cavedale  
Radial Calcite Dirtflow Riff

### Day 2 Castleton - Cavedale

Examine the sedimentology of the northern edge of the Derbyshire Platform. Walked through Cavedale along the Limestone Way examining the margin of the steeply dipping platform margin and faults.

- Cavedale provides a perpendicular transect through the margin of a carbonate platform. It is possible to see dipping beds, cross bedding, fragmented bioclasts, and geopetal structures.
- Reef mounds – massive (non-bedded) features. In thin section this white rock comes 'alive' composed of fragments of brachiopods, bryozoans, crinoids and small corals cemented in a micritic matrix
- Volcanic activity is represented by quite well-formed columnar basalt. Beyond the platform margin the horizontal beds are thinner. The thin marls are likely to be volcanic derived material.
- Dirtflow Rake – a large fault along which mineralisation occurred which has been mined for galena, fluorite and barite. Along regional E-W to NW-SE alignment with tectonic trend.

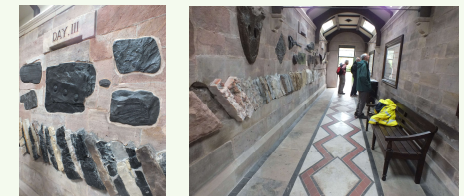
### Day 3 East Staffordshire

East Staffordshire Roach – mid Carboniferous (Namurian aged 320-330 my) coarse grained deltaic sediments. N/S to NE/SW synclines are a compressive set of structures Gritstones resistant to erosion – high ground and the clays and silts in the valleys'. Moving westwards

- Roaches Namurian in age are Gritstone Edges deposited in large lower deltaic plain.
- Red Rock Fault forms the eastern edges of the thick Triassic sequence Cheshire basin. The throw is thought to be in excess of 1500ft with a NE-SW strike.
- Mow Cop - Castle (photo top right). A folly built in 1754 by the Wilbraham family on a resistant ridge of Chatsworth Grit. Extensive faulting on the western edge of the Carboniferous outcrop. Abundant slickensides (photo below) and barytes mineralisation
- Biddulph Grange the geological gallery created by James Bateman between 1856 and 1862. This geological curiosity details the six days of creation with the seventh absent – maybe he created the gardens on day VII. As the property has changed hands the Gallery has gone unloved and many specimens have disappeared. Recent work by the National Trust and others including the GA Curry Fund has enabled the Gallery to be restored to its former glory.



Gardens at Biddulph Grange and slickensides at Mow Cop



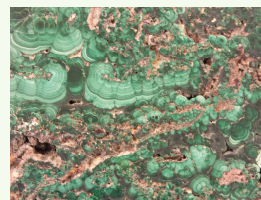
Galleries at Biddulph Grange



Group photo at Mow Cop. Photo Frank Ogilvie



Mining memorabilia Ecton Mine



Malachite



The Devonshire's Chatsworth House



Burlington House (Their London residence)



Biddulph Grange can you spot Hertfordshire Puddingstone?