U3A Field Trip to Burrington Combe
23rd July, 2018.

Main Rock Types.
CDL- Clifton Down Limestone BO- Burrington Oolite BRL- Black Rock Limestone
Summary.

Walking in a southerly direction up Burrington Combe, we passed through
a sequence of massively-bedded Carboniferous limestones,
all laid down in warm, tropical seas when Britain south of the equator.
The rocks were getting older, and, as we climbed the BRL- Black Rock
Limestone valley of the East Twin Brook, at the swallet, we crossed the junction
of the BRL with the Avon Beds. These clays and sandy deposits marked the
incursion of the sea over the Devonian desert sandstone.

Site A. Car park near the Rock of Ages. [Grid ref. 477 588]
This was roughly on the boundary of CDL and BO. Beds, where visible, dipped steeply 65 degrees to the north, caused by the Variscan Orogeny.
In the cliffs, a more narrowly-bedded band of **Dolomitic limestone** stood out clearly. [Under certain conditions, magnesium dissolved in water has been introduced into the molecular structure of the calcite, resulting in a harder rock.]

Pluckily scrambling a short distance up the east side of the combe, we saw an exceptionally complete example of a colonial coral, **lithostrotion**, in the CDL. The whole mass of the coral [corallum], fanned out from the point of attachment to the rock at its base. The corallites, tubes in which the creatures once lived, were clearly visible. Warm, shallow tropical seas much like the clear waters round Bermuda today, must have been the environment of deposition.
Before leaving the car park area, we looked at some specimens of BO. A hand lens made clear the rounded grains [ooliths]. A small, dark centre was visible, perhaps a grain of sand around which the calcium carbonate had precipitated. Each oolith had rolled up and down a beach, gradually increasing in size
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Site B.

After walking southwards along the road for a few hundred yards, we looked at some specimens of BRL taken from the scree slopes. This rock was bioclastic, with many small fragments of crinoids and corals, smashed in a strong tidal zone.
A few slightly larger fossils were **a rugose, solitary coral and spirifer, a long-hinged brachiopod.** Its ribbed shell indicated a high-energy environment. BRL contains a lot of clay minerals, which make it darker than the younger BO and CDL.

Site C. East Twin Swallet. [Grid ref. 479 582]

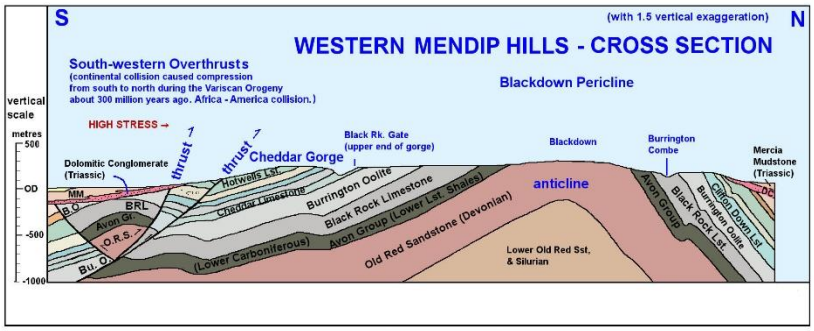
This was a clear and dramatic marker of the junction between the BRL and the Avon Group sandstones, clays and mudstones. Water in the East Twin Brook has run for millennia from the top of Black Down, over the impermeable Devonian sandstone, and the variable bedding of the Avon Group rocks until it reached the soluble BRL, where it has gradually worn away a large swallet hole. This vertical shaft was the entrance to an underground river system.

Following the brook upstream, we saw many angular chunks of Devonian red sandstone, which had not travelled far. In contrast, the rounded quartz pebbles embedded in a sizeable specimen of Devonian conglomerate, must have been carried a long way to be worn so smooth. [We saw similar conglomerates at Beacon Hill, evidence of a major river system flowing from Wales, or perhaps the Lake District.]

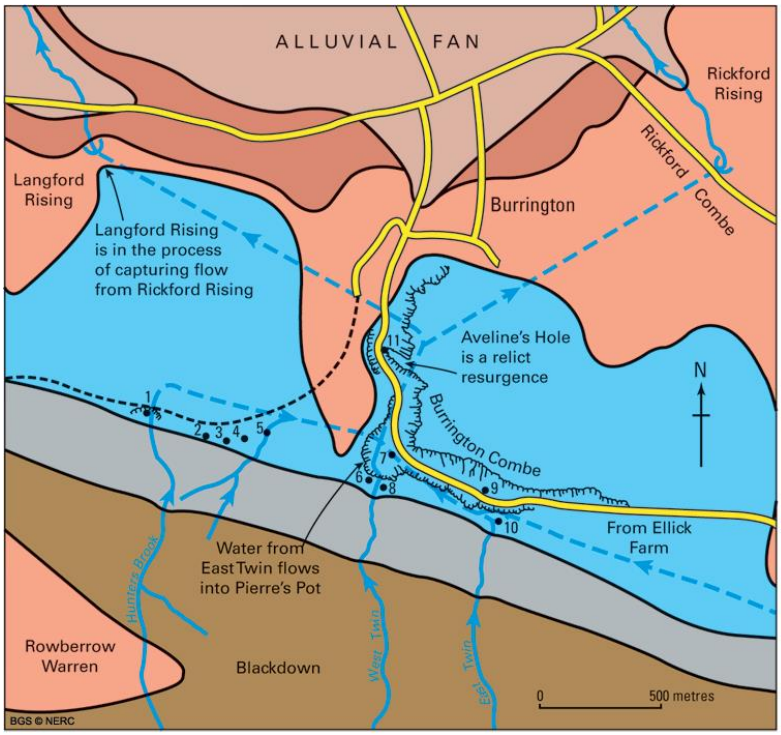
Finally, the stepped stream bed, showed how changeable conditions had been in this area at the start of the Carboniferous. There were clear bands of narrowly-bedded dark limestone interspersed with layers of softer clays and sandstones which the stream had worn away.

Some geological background.

Geology of Burrington Combe by Ian West University of Southamton



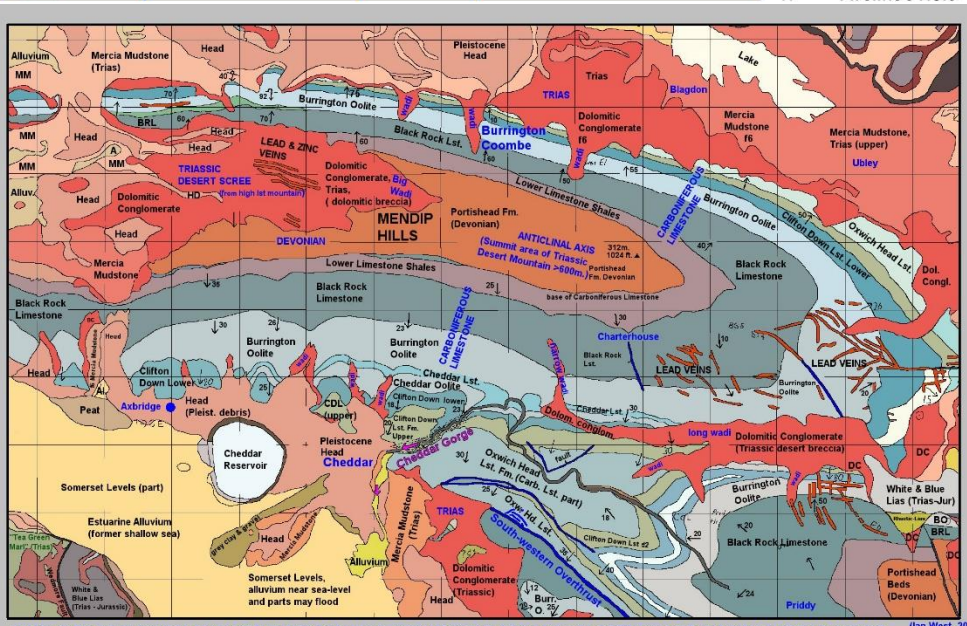
SIMPLIFIED CROSS-SECTION OF THE BLACKDOWN PERICLINE OF THE WESTERN MENDIP HILLS.
This is based on a BGS cross-section but has been completely redrawn with some simplification and with stratal units having been given colour emphasis. This asymmetrical structure is a response to severe northward pressures of the powerful Variscan Orogeny. One other effect of this is that the oolitic limestones here are not like Portland Oolite but have lost most of their inter-ooid porosity at a very early stage. They do not look so obviously oolitic in the field. In general, the Carboniferous Limestone here probably has low intergranular permeability and this may favour water-flow through cave systems. Go to BGS maps and publications for more details. Ian West © 2018.



Portishead Formation
Avon Group
Carboniferous Limestone
Dolomitic Conglomerate
Mercia Mudstone
Head
Road
Footpath
Stream
Underground stream

Caves (•)

1 Read's Cavern
2 Bos Swallet
3 Drunkard's Hole
4 Rod's Pot
5 Bath Swallet
6 Sidcot Swallet
7 Pierre's Pot
8 Goatchurch Cavern
9 Lionel's Hole
10 East Twin Swallet
11 Aveline's Hole



SIMPLIFIED SUCCESSION OF STRATA

- Estuarine Alluvium (young sediment of reclaimed estuaries)
- Holocene Alluvium (young river sediments)
- Pleistocene Head (hill-wash, debris etc.)
- Jurassic (details not discussed) (mostly Lias and Inferior Oolite)
- (sometimes Trias - Jurassic transition, sometimes unconformity)
- Mercia Mudstone (red silt - blown desert dust, Triassic)
- Dolomitic Conglomerate (desert wadi breccias, Triassic)
- (major unconformity - no Permian)
- Oxwich Head Lst. Fm. (formerly Hotwells Lst. About 210m.)
- Clifton Down Lst. Upper (Carb. Lst, variable, about 80 or 100m.)
- Clifton Down Lst. Lower (Carb. Lst., variable, fairly thick)
- Cheddar Oolite (Carb.Lst part, variable)
- Cheddar Lst. (thin & variable)
- Burrington Oolite (Carb. Lst., 175m approx.)
- Black Rock Lst. (Carb. Lst., dol. at top, 280m. app.)
- Lower Limestone Shales (Carboniferous Lst., basal)

CARBONIFEROUS LIMESTONE

- (unconformity - fairly parallel)
- Portishead Beds (Devonian) seen to 490m.

SIMPLIFIED GEOLOGICAL MAP OF THE MENDIP HILLS, SHOWING THE GEOLOGICAL SETTING OF THE NEW CHEDDAR GORGE.
This is a completely redrawn, simplified, modified and relabelled map, but it is based on parts of the old BGS maps of 1959 and 1962 (Cheddar Map and Bristol Maps). It recommended that you obtain the original BGS maps for more accurate detail, including the topography. Interpretation of the map in general terms is simple for anyone with basic geological training, even though the topography is not shown. First, see the east-west anticline in Carboniferous Limestone, with a Devonian core. There is another, similar anticline in the southeast corner of the map. The real problem is that much of the Mendips has been involved in major thrusting. See the South-western Overthrust. This is more extensive than it appears because it is partly concealed by Dolomitic Conglomerate, Pleistocene Head etc. There has been major thrusting not obvious on the map. Notice the conspicuous topographic unconformity at the base of the Triassic Dolomitic Conglomerate. This is a Sahara-like, desert scree mainly in wadis or dry valleys. What we see now is the eroded relic of desert mountain about 1 km. high. Some of the mountain valleys or wadis have been partially re-excavated recently; Burrington Coombe is an example. However, Cheddar Gorge is anomalous. It is very young, perhaps only about 150 thousand years old. Indeed, it is about 230 million years younger than the Dolomitic Conglomerate valleys. It is a peculiar late Pleistocene drainage anomaly. The origin of Cheddar Gorge almost concides with the time of human development in the end part of the Pleistocene Ice Age (although often too cold for humans here). Use the map as an introduction. Ian West © 2016.