GEOLOGICAL SOCIETY - WMRG

Field Excursion - Social - September 4th, 2018

Wrens Nest - Field Notes

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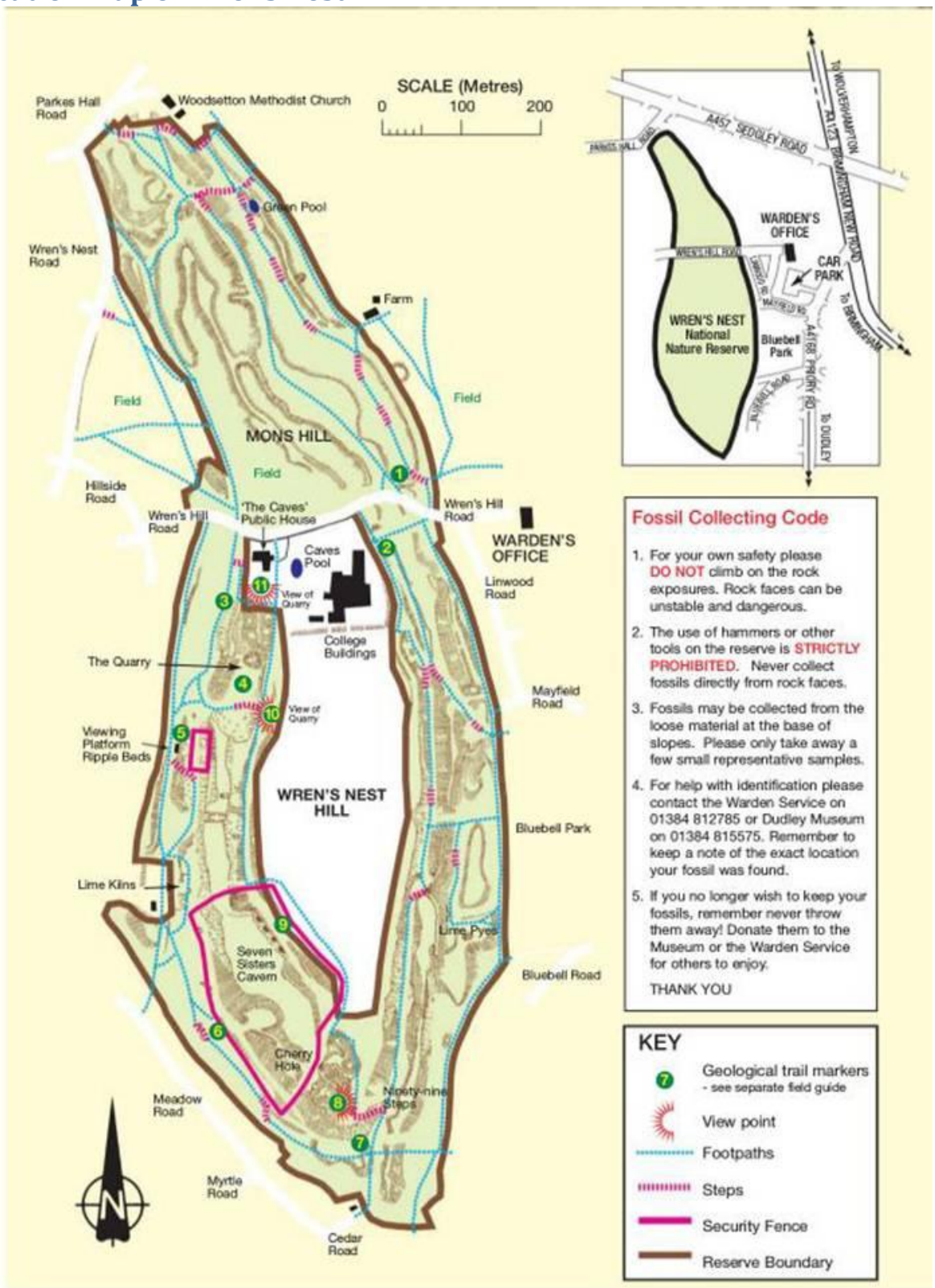
12 participants joined this short excursion of the Wrens Nest. Organised by Ray Pratt and led by Graham Worton 5 of the 11 localities were visited and discussed. Evidence for the changing depositional environments was discussed based on the exposures visited.

Location Map of Wrens Nest



Map Location 1. Quarry Trench, Mons Hill (The snake pit)

Beds dipping east at circa 60 degrees
The main rock face is the Nodular member of the Much Wenlock Series
Thin and massively bedded limestones with thin calcareous shales are seen.
The top of beds show possible ripple marks, and loading features, lots of fossils and fossil fragments. The fossils are noticeably and broken. Common small fossils indicate an inhospitable life environment at the time of death. Broken fossils indicate agitation and reworking.

This section indicates apparent changes of depositional environment.

1. Shelly beds indicate deposition in a shallow sea setting within the wave zone, with a winnowing away of the mud. High energy environment.
2. Muddy sediments settle out in deeper water.
3. Fluctuations in the water depth indicated.

The Much Wenlock Lst Series (type section in Wenlock Shropshire), is overlain by mudstones & siltstones of the Ludlow Series. This is a point in time when sea levels globally rose, possibly as a consequence of melting ice sheets. Thin interbeds of claystone and thin limestone's are not a consequence of rapidly oscillating sea levels. The limestone beds are graded with the coarse material at the base indicating that they have been moved from the shallow depositional environment to the deeper depositional environment during storms. Lots of broken fossils indicate that the deposits are not in situ. Some of these limestones have a rippled surface indicating that they were not below the wave base at particular times e.g. during storms. Therefore they were dumped in position in an environment just below the wave base.

Storm deposits take place almost instantaneously whereas the muds takes years to form.

Looking at the Wenlock /Ludlow boundary. White yellow Green plastic clay of volcanic origin. Contain zircons and other radioactive elements. Ce, Th, U
During the 1920s-1950s radiometric dating developed which is based on radioactive decay. Commonly use zircon crystals. In 2011, 2 kgs of this clay was sent to the National Isotope Laboratory in Nottingham . 200 zircon crystals were collected which resulted in a sharp peak at 427.7 7 mm years +/- 0.25 mm years, 3-4 mm years older than fossils indicated. (Fossils had suggested a date 420-425 mm yrs). This work placed a golden spike in time for this geological boundary.

Elsewhere other scientists found bentonites and undertook radiometric dating which resulted in the base of the Much Wenlock Series being placed at 431 mm years, a duration of 3.23 mm years of deposition.

Map Location 2. NCC Cutting (1977)

The cutting exposes the entire section of the nodular beds member, exhibiting loading features, boudins, thin shale interbeds. The beds dip to the east. Near the entrance the limestones are are coarse grained becoming more argillaceous down sequence.
Walk up the path the beds become older with a lot more interbedded claystone.
The limestones contain small fossils and fossil fragments. The clay is buff brown and crumbly. Occasional white calcite veining along fractures and bedding.

Thick clay layer
About 1/4 of the way along the NCC cutting a thick clay layer is seen consisting of bentonite of volcanic origin. The volcanism severely changed the environment resulting in localised extermination of sea life during the deposition of this layer. This left a flat surface, below wave action preventing ripples development.

A little further up the cutting on the left (south) side a noticeable "big lump" can be seen with a slikenside surface visible. (seen opposite the plaque on the northern cutting wall). This is an in situ stony coral patch reef. These develop where water is clean enough & shallow enough for the coral to thrive. The claystones (above and below) represent deeper environment. Part or parasequences - different depths of water deposits indicated . i.e. sea water level not stable or sea bed not stable. Oscillating sea level ???

West end of the NCC cutting, at top of path, shales not as prolific and limestone more blocky similar as seen in the snake pit. A trench running north south is evident, where the Lower Limestone member has been quarried out. This traverse has taken us back in time 1.1 mm years. The lack of muds at the top of the cutting indicate a shallower depositional environment. Trace fossils can be seen on base of visible beds.

The lithologies by the stairs at the top of the cutting belong to the underlying Coalbrookdale Formation

Location 9 - Severn Sisters

Lower quarried Limestone form pillars. Pillar & room quarrying. The edges of the pillars are defined by the fractures within the limestone. The visible entrances are only half the actual size.

Currently all entrances blocked off with Road aggregate. This is a temporary solution. If the council develop the mines as a tourist project (Strata project - plan to create rooms underground to promote tourism), the aggregate can easily be removed. In 1960 two pillars were removed due to danger of roof collapse, but not easy and expensive. Resulted in a fence being constructed and the entrances blocked by the aggregate. Now the mine galleries are used by hibernating bats

Getting the quarried material out was very difficult as it required the pulling of the stone uphill to load onto horse & cart. In 1665 documentation at the time recorded 10000 ironworks in operation in the area all using limestone. In 1770 the canal system reached here and opened up canal basins 72 m below the workings. This led to accelerated production, being much easier to load the worked stone downhill onto a more efficient transport system.

The quarrying Resulted in a world class fossil collection and a sequence of stratigraphy with 6-700 new fossil species. 186 type species are from this location, with 63 not found elsewhere.

In the 1800s the church was sponsoring research into these fossils, of which Murchison was one such recipient. By 1839 Murchison characterised the rocks. 65% of his fossils for the Silurian come from here.

Location 5: The Fossil Trench

Ripple marks within the wave zone. Move sideward's (to right - south) the beds becomes hummocky as a result of bioturbation (shallower water). To the other side is a reef mound - range of depositional environments (open sea reef to shallower water).

The Apollo mission left a mirror on the moon (Sea of Tranquillity) 1969.
Laser measurements since then have discovered that the moon has been moving away from the earth by 4-7 cm a year. Suggests that the moon was a lot closer in the Silurian time and tide surges and depth of the wave base would have been greater

The palaeo-magnetism suggest that these rocks were deposited cica 20-23 degrees south of the equator, current position of Brazil.

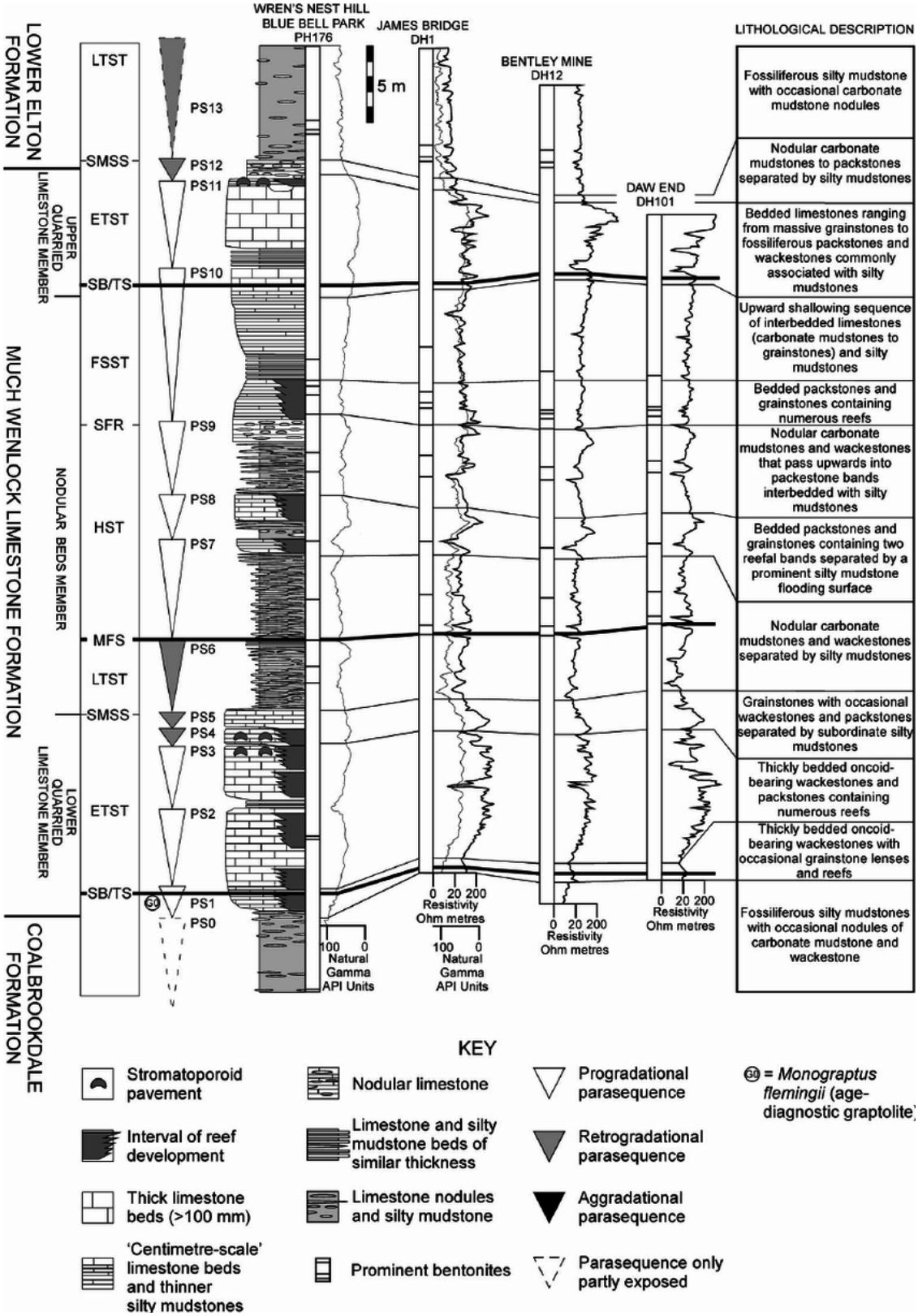
Location 4. The Quarry

This patch reef is circa 15-20m long and only 2m thick. This indicates that it did not need to continuously grow as in sheltered back lagoon. 650 macrofossils have been found here due to its sheltered environment. At Wenlock there are towering barrier reefs as facing out to the open ocean.

Structural History Summation

The trend of the Wrens Nest is based on north south Pre Cambrian lineaments. The initial folding of the Wrens Nest pericline was probably formed during the Caledonian orogeny. The Variscan produced EW folding , a reactivation of the existing trend. There does not appear to be any effect from the Alpine orogeny.

The calcite veining seen at location 3 is a consequence of the folding - tension gashes / en echelon structures. Groundwater re-precipitation filled these fractures with calcite.



Ref:https://www.researchgate.net/publication/248686756_Late_Wenlock_sequence_stratigraphy_in_central_England/figures?lo=1