



## NORTH EASTERN GEOLOGICAL SOCIETY

Newsletter June 2014

<http://www.northeast-geolsoc.50megs.com>

### 1. NEGS SPRING/SUMMER FIELD MEETING PROGRAMME

**Report of the Field trip to the Cleveland Basin: sediments found in areas within the Hambleton and Howardian Hills.**

**Leaders: John Powell and Jon Ford (BGS)**

In Jurassic times, the relatively small Cleveland Basin was part of a wider area covered by shallow seas. During the Middle Jurassic the sedimentation was characterised by sediments that mark a series of marine transgressions and by the progradation of fluvial and deltaic siliciclastics toward the South East. The basin was affected by a number of extensional faults including the Howardian-Flamborough Fault Belt which crossed the area of our field visit on an E-W orientation. This could be seen by distinct changes in the topography. Five sites were visited. In terms of the progress of the day, these were:

1. The overview of the geology and landscape in the immediate vicinity of Sutton Bank **National Park Information Centre** (NGR SE 516 829). From the edge of the bank the Middle and Upper Jurassic features, rockslides associated with these and landscape features attributable to the Devensian ice sheets could be picked out. The Lower Jurassic is represented in the view by the underlying Upper Lias of the flatter Vale of York. Interpretation of this view is enhanced by an examination of the BGS maps on display in the Visitor's Centre.



2. The Upper Jurassic Hambleton Oolite Member (part of the Corallian Lower Calcareous Grit (**LCG**)) caps the escarpment of the Hambleton Hills and forms dip slopes north of Pickering. The lower part of the Hambleton Oolite Member outcrops in **Shaw's Gate Quarry** (SE 5233 8236). The rocks there were deposited on a warm shallow carbonate platform and are characterised by a spicule-rich succession of sandy oosparite. A pale grey to white laminated calcareous ooidal limestone and calcareous sandstone with disseminated ooids can be found there. The horizontal bedding exhibits a range of interesting sedimentary structures and trace fossils (small vertical *skolithos*-type burrows and the larger *Thalassinoides*). Of particular note to us were the convolute bedding and soft sediment injection features suggesting the displacement of the pore-waters during seismic disturbance. Cross-bedding and shallow scours are common there too. These features are localised in terms of general

basin development and may be explained by deposition resulting from submarine debris flows that relate to the angle of deposition in a more unstable basin position.



3. In **Raven's Gill** (SE 5295 8186), a deep gully which proved challenging for some, the LCG Oldstead Oolite Member lies at a marked low angle unconformity on the marine Osgodby Formation (a.k.a Kellaways Rock). This break in succession resulted from tectonic events in the Callovian when siliciclastic sedimentation was disrupted. Consequently, the deeper marine ammonite-rich Oxford Clay Formation is missing here. Its absence marks a period of uplift that also created an uplifted and tilted block. The Oxford Clay is found elsewhere between Raven's Gill and Shaw's Gill indicating that it was originally deposited but removed later during localised, but rapid erosion, associated with the uplift. Overall 5 ammonite zones have been removed.
4. **Mowthorpe Quarry** (SE 67 68 on private land) lies in the west of the Cleveland Basin. In this location, a carbonate facies of the laterally variable Dogger Formation is found as a relatively thick development of a cross-bedded bioclastic limestone. It contains the millipore bryozoan *Hapliocia straminea* (the *Collapora straminea* of Phillips 1892 (Powell 2010)). This deposit may represent part of a small sub-basin carbonate platform. Evidence at both Mowthorpe and Shaw's Gate Quarry (above) suggests that ooidal banks formed as shoaling highs which may have been reworked and deposited off-shore in local down warps.
5. At **Burythorpe Quarry** the lower part of the Osgodby Formation (a.k.a. Kellaways) is quarried for sand and siltstone. The lithologies there are unusually soft and decalcified enabling it to be easily worked. Beds are commonly cross-laminated and show a range of other sedimentary structures. Of particular note were the small vertical syn-sedimentary back-filled faults and the incipient growth of concretions which cut across the sedimentary features. These concretions grow to a very large size and are currently found lying on the quarry floor (their size and weight make them difficult to remove). fossils are surprisingly absent but vertical burrows indicate the temporary colonisation of substrate between flooded surfaces. Channels are common too, lagged with mudstone facies containing abundant plant remains.



This was an excellent field visit. Thank you to all who made the day possible. Thank you to the leaders who communicated their knowledge of the Cleveland Basin so well. And gave us such an excellent handout.

#### References

Powell, J. and Ford J., 2014, *Field Handout*

Powell, J.H. 2010 Jurassic Sedimentation in the Cleveland Basin: a review. *Proceedings of the YGS 58 pp21-72.*

Thanks to Christine Taylor for this report. As you can see by the photographs, we had some dull, wet weather but this did not deter anyone. Should anyone wish to peruse the very informative handout do let me know (negsec@gmail.com) and I'll bring it along to a field or lecture meeting.

#### Reminder and information for next meetings provided by Eric Johnson

##### Saturday 5<sup>th</sup> July 2014

#### **Lady Cross Quarry and Blanchland. Leader: Eric Johnson**

**Meeting Point** Blanchland Car Park [NY966 504] at 12.30pm

**Logistics** Share cars and drive to Lady Cross Quarry [NY953 551] (about 10 km/6 miles) to start visit at 1pm. Tour of quarry and nature reserve tour led by the owner, Robin Turner. Leave quarry about 2.30pm. Walk back to Blanchland via Shibden valley – about 6km/4miles Return to Blanchland for about 4.30pm. Ferry drivers back to pick up cars.

**Food** Lunches are available from the tea shop or pub in Blanchland. Alternatively bring your own packed lunch and drinks.

**Toilet facilities** Public toilets in Blanchland. Arrangements at quarry tbc.

**Geology** Carboniferous (Namurian – Westphalian stratigraphy, sedimentology and depositional environments. Mineralisation. Geological resources.

**Route** From the quarry, the route follows moorland tracks and footpaths. Wear appropriate footwear and outdoor clothing to suit the weather on the day.

**Safety** Hard hats may be required in the quarry, please bring your own. A personal first aid kit should be carried.

**Maps** OS Landranger 1:50 000 Sheet 87 OS Outdoor Leisure 1:25 000 Sheet 43 BGS Sheets 19 Hexham 20 Newcastle.

**Other Information** Lady Cross Quarry website [www.ladycrossstone.co.uk](http://www.ladycrossstone.co.uk)

##### Sunday 20<sup>th</sup> July 2014

#### **Austwick and Crummackdale. Leader Eric Johnson**

**Meeting Point:** Crag Hill Road near Horton in Ribblesdale station [SD804 725] at 10am.

**Logistics:** Park by the roadside in Crag Hill Lane; 100metres or so south of the B6479 junction. Share cars and drive to Austwick (about 8km/5miles) for 10.30am start. Park cars next to the green in the centre of the village [SD768 685]. Walk back to Horton in Ribblesdale via Crummackdale - about 6km/4miles for 4pm. Return drivers to Austwick to pick up cars.

**Food:** Bring your own packed lunch and drinks.

**Toilet facilities:** There are public toilets in the car park in the centre of Horton village (about 500m metres east of the meeting point). There are no toilet facilities between Austwick and Horton in Ribblesdale.

**Geology:** PreCambrian. Late Ordovician – Silurian stratigraphy, sedimentology and depositional environments. Early Devonian orogeny and structures. Carboniferous Limestone transgression and deposition. Late Carboniferous extension faulting. The effects of the Quaternary glaciation.

**Route:** The itinerary follows minor roads, tracks and footpaths. At one locality, there is a short section that involves some scrambling to examine the basal Carboniferous unconformity. This section can be by-passed if required. Wear appropriate footwear and outdoor clothing to suit the weather on the day. Walking poles may be advantageous on steeper sections of the route.

**Safety:** A personal first aid kit should be carried.

**Maps:** OS Landranger 1:50 000 sheet 98. OS Outdoor Leisure 1:25 000 Sheet 2 BGS Sheets 60 Settle and 50 Hawes.

**Other Information:** The itinerary is based on Field Excursion 1 Lower Palaeozoic rocks of the Craven Inliers in Yorkshire Rocks and Landscape: A Field Guide published by the Yorkshire Geological Society



Could members email me with notice of **'intention to attend'**, so that we can have some idea of the numbers? This, of course, does not exclude you if you should decide at the last minute that you will attend. Car sharing would be a good idea - If you are willing to car share, or would like a lift let me know and I will put out an email to all. I will need your name, location and contact (which I will not share with whole mailshot unless you're okay with that) and we'll try and get something co-ordinated. (negsec@gmail.com)

### **Saturday 13<sup>th</sup> September**

Lower Jurassic Rocks between Whitby and Saltwick Bay.

Leader: John Waring.

Provisional arrangements – more information later.

### **Saturday 25<sup>th</sup> October**

Building Stones of Durham Cathedral. Organised as a formal Cathedral tour (at a cost of £5/person).

Leader: Brian Young (retired BGS/ Durham University)

## **2. NEGS AUTUMN/WINTER LECTURE PROGRAMME.**

**Last, but not least: Report of a talk given at the AGM in March 22<sup>nd</sup> 2014.**

### **THE STONES OF DURHAM**

A very large audience welcomed Brian Young for a talk on the building materials used in Durham Cathedral. There will be a linked field trip later in the year.

The word geology may originate from a 1333 text that used geologia in Durham. The cathedral sits in an incised meander of the R Wear and rests on the Coal Measures. Early maps and lithographs accentuate the location but also reflect the absence of trees in much of the early times. Drift deposits are limited on the peninsula but have influenced the building.

The building sits on the sandstone bed called the Low Main Post; this is probably the source of the 68000 tons of stone used to build the Cathedral. The location of the quarry is not certain but careful analysis of the rock character and scale of extraction favours the allotment area off Marjorie Lane. This is close to the construction and appropriate for building in 1093! (the construction lasted 40 years using very simple techniques.) Some photographs highlighted the likely source and exposures close to the Cathedral that demonstrate the Coal Measure exposed, plus mine drainage locations.

The building is very special as it demonstrates solutions to construction problems that were new and very challenging. Examples being the quadrant arches that predate the flying buttress and the vaulting for the ceiling which is large scale. Analysis today points to a total plan being in place and very competent builders – who are not recorded beyond the existence of some face carvings supporting a roof drain!

The sandstone is coarse and irregular with coal scases, cross bedding and iron nodules visible. Liesegang circular staining is well developed on the west wall whilst some epsomite efflorescence is seen close by, probably due to groundwater and mortar reaction.

Significant parts of the structure have been replaced of course (although the roof beams are often as good as new!) The Springwell Quarry at Gateshead sourced the stone in the late 1900's to early twentieth century. Today a quarry at Barnard Castle is used but the stone is very uniform and weathers slowly leaving the 'new' white stone very evident.

The Romanesque roof demonstrates the insight of the builders as they added a point to the arches; this greatly increased its strength. Meanwhile Welsh slate covered the roof; today the green slate from Hoister in the Lakes is used. Lead is used for some areas; originally it is probable that this came from the Weardale area. A few downpipes may still represent the original lead. The Monks owned coal and lead workings at the

time of the construction.

In the Nave the black line of Frosterley 'marble' marks the boundary which women could reach until quite recently. The Nine Alter Chapel was built 100 years after the Cathedral. Bits of the Frosterley marble in the pillars are not polished, it is suggested this was a pragmatic cost saving device!

The Lady Chapel fell down when first being constructed, the drift deposits were identified as the likely cause so it was removed causing the steps down into the chapel.

The St Cuthbert shrine is Carboniferous limestone, probably from the wide jointed Eggleston limestone at Barnard Castle. Bede has an Eggleston limestone cover. The checkerboard flooring at the crossing is carboniferous limestone. Rich in Dibunophyllum, this fossil is said to be fishlike in some localities!

The Galilee Chapel has thin roof supports suggesting an Arabic influence, there is only a wooden roof so the strength was much less than that of the original building. Originally only two pillars were used; later some Purbeck 'marble' was used to add additional pillars. The smoke in the cathedral is thought to have helped that material to decay rather badly in places.

The High Alter has the Neville Screen, this dates from 1380. It is a French Jurassic oolite and remains as pristine as when it was made. Alabaster is used for several structures including effigies of Van Mildert and much of the pulpit which also has exotic inclusions.

The presentation was clearly very comprehensive and knowledgeable, the photos allowing the audience to easily follow the account. There was an extremely warm thanks offered for the evening.

Thanks to Gordon Liddle for this report. This whets the appetite for the field visit in October.

**Suggestions (with names, contact if possible) for speakers would be appreciated by Prof. G. Foulger. : email: [g.r.foulger@durham.ac.uk](mailto:g.r.foulger@durham.ac.uk)**

### 3. NEWS

There is no specific information to report

### 4. INFORMATION

Nil

### 5. ADMINISTRATION

In an effort to have more membership input to the proceedings of the Society there will be some newsletter developments in the future.

Some of the things we would like members to share are:

- News
- Information
- And feature items
  - E.g. 'My favourite ..... geological exposure / rock sample' – what, where and why it's your favourite. A photograph would be useful where possible.
  - Book reviews. Read any good new books / new editions lately?

If you receive this newsletter by post and have an email address, then please let me have it.

[negsec@gmail.com](mailto:negsec@gmail.com)

Best Wishes, Chris Burridge (Secretary) Tel: 01915289707