



NORTH EASTERN GEOLOGICAL SOCIETY

Newsletter Sep. 2013

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

1. NEGS SPRING/SUMMER FIELD TRIPS.

The Field Trip Secretary would appreciate hearing from volunteers to lead field trips, also suggestions for field trips would be appreciated.

The September Field trip was to be led by Brian Turner who had to cancel due to illness. Gordon Liddle stepped into the breach and provided a well organised, extremely informative and interesting day. Thank you Gordon. **Reports of June and September Field Trips in 4.**

2. NEGS AUTUMN/WINTER LECTURE PROGRAMME.

Dates for the meetings have been agreed, these are as usual, on the third Friday of each month except for the December meeting which has been moved forward one week to avoid being too close to Xmas.

Friday **October 18th**

TBA

Friday **November 15th**

Prof. Andrew Aplin, Durham University

Shale Gas: Geology Matters

Friday **December 13th** – **Members Evening.**

- Gordon Wilkinson Uluru and Kata Tjuta – the geology of a unique area
- John Waring Rocks under the microscope; making thin sections by an amateur.

Friday **January 17th**

Dr. Richard J. Brown, Durham University

How we can understand Pyroclastic flows

Friday **February 21st** Prof. Jon Gluyas, Durham University

Getting Into Hot Water: Exalting Low-Enthalpy Geothermal Opportunity in the UK

Friday **March 21st**

Brian Young, Durham University

The Stones of Durham, (with particular reference to Durham Cathedral)

Suggestions for speakers / topics you would like to hear discussed would be appreciated by Prof. G. Foulger. Send comments to me at negsec@gmail.com

NEWS

- i) It is with sadness that we report the death at 90, of Martin Taylor, in June this year. Martin was a member for 33 years from 1980, and even when not able to attend in person still appreciated the contact with the society.

(ii) From the Geologists' Association Office
GA Forthcoming Events

There are 4 forthcoming events during September and October, we'd like to draw your attention to, please pass onto your members:-

The GA ANNUAL CONFERENCE in Durham on 21 and 22 September details and registration available on our website www.geologistsassociation.org.uk

NEGS Chairman invited people to help in organising a presentation at this meeting on behalf of NEGS. Gordon Hull volunteered. We hope it goes well, thank you Gordon.

GA LECTURE: Friday 4 October: Henry Stopes Memorial Lecture: Confessions of a Flint Knapper - Phil Harding

WEEKEND FIELD TRIP on: October 5-6 Dorset Coast,
Dorset Coast Weekend Leader: Prof John C.W. Cope (National Museum of Wales)
5th and 6th October 2013

John has agreed to lead another trip, this time looking at the west Dorset coast (mainly Lower and Middle Jurassic). Based in Bridport, there will be an introductory talk on the Friday evening and a group dinner on Saturday. We will finish at about 16:00 on Sunday. We are hoping that Bob Chandler will attend the trip and show us some inland localities of Inferior Oolite... lots of Ammonites to be found!

If you are interested in any of the Conference or the Dorset field trip, please contact Sarah in the office. 020 7434 9298 or geol.assoc@btinternet.com

Geological Society Meeting: Ask the Mountains Their Story: an evening of science and literature. Friday 18th October 7pm-8pm

4. INFORMATION

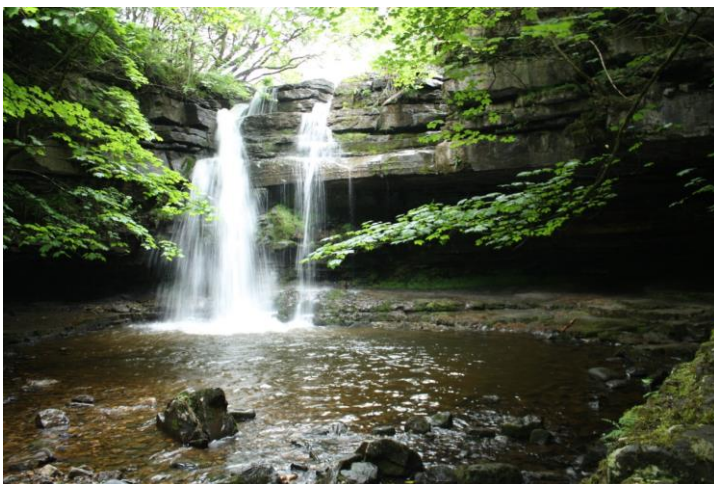
June Field Trip, Bowlees, Low Force and Holwick Scar, led by Brian Young.

Report of June Field Trip provided by MavisGill, picture by Chris Burridge.

Despite a rather doubtful weather forecast, nine people prepared themselves for another trip to look at the Carboniferous rocks and one of the best exposures of the Whin Sill. We started by following Bow Lee Beck upstream to the nearby limestone quarry where the Scar Limestone was exposed. Brian pointed out the numerous small faults to be seen in on the quarry face and the associated natural cavities containing episodes of recrystallisation. We then proceeded further upstream, noting that we had now passed into sandstone which had been laid down in shallow water and energetic conditions. Fossilised ripples and an ichnofossils were preserved on the surface of the rocks in the stream bed. This section of the river clearly demonstrates the cyclothemic progression, where limestone- shales/coal - sandstones- reflect a marine transgression to terrestrially derived sediments as a shallow marine gulf infilled with prograding deltaic sediments.



We encountered a waterfall formed by a small fault (with a displacement of less than a metre) cutting across the stream exposing a block of the limestone at the side of the stream. Then continuing to Gibson's Cave, an overhang of sandstone beside a waterfall. The limestone beds were observed to be lenticular in form, and the overlying Slatey Hazle sandstone was thinly bedded, interspersed with shales. We completed our traverse upstream at Summerhill Force, a waterfall which has cut back through the Five Yard Limestone, forming its lip. Underneath were sandstones and shales with thin coal layers, though they could not be seen easily in current conditions. Brian gave us an interesting description of the names of the sandstones and limestones adopted by the miners who worked in the North Pennines.



SUMMERHILL FORCE with GIBSONS CAVE,

We walked down to Low Force, the River Tees being in full spate after the recent rain, as it roared over rocks of the Whin Sill, a late Carboniferous dolerite intrusion. Brian drew our attention to the columnar structure within the Whin Sill as a result of cooling stresses in the molten magma as it intruded the Carboniferous beds. We hurried over the Wynch Bridge and sought shelter among the trees as we encountered a fairly heavy shower. Lunch was taken by the well-known sandstone and shales raft, a remnant of the fallen 'roof' as the sill intruded. We had time to observe the glassy surface at the base of the Whin Sill due to the

rapid cooling as it came into contact with the sandstone, and noted that the sandstone, in turn, had been baked to a hornfels.

We proceeded further down stream along the Tees, the Whin Sill now dipping out of sight into the stream bed. Adits and spoil heaps in the fields to the south west were evidence of previous mining activity, a search for zinc during the second world war, and Brian showed us examples of sphalerite and siderite which he had found on the heaps. Mineralisation had taken place when hot fluids circulated in the Carboniferous beds.

Our return route took us southwest over some very pretty meadows to Holwick Village, towards the spectacular Holwick Scar, here we saw almost the full thickness of the Whin Sill, with its striking columnar appearance. But we thought that we had left the Whin Sill behind in the bed of the River Tees below.



BRIAN EXPLAINING THE FORMATION OF HOLWICK SCAR

However, a tell-tale north-west south-east escarpment, which extended as a prominent feature along the valley, gave us a clue. Brian explained that this was a one of two faults, with the down throw towards the north, thus exposing the Whin Sill in front of us. We enjoyed a very pleasant walk back along the road, and then through meadows back to Bowlees car park, observing the drumlins and other glacial features along the way.

Our thanks go to Brian for a most interesting and informative trip, undertaken at one of the most rewarding times of the year in these glorious Teeside meadows.

September Field Trip, Seaton Sluice – St Mary's Island (Hard Hats essential stops 1 3,4)

Report of Field Trip provided by Gordon Liddle, photographs by Chris Burridge

[Carboniferous Westphalian sediment exposures](#)

Based on work by Brian Turner / Gill Tester (Sedimentary Geology), Robson's Geology of NE England and the Hunter-Easterbrook Geological History of the British Isles.

A sizable, enthusiastic group of members and friends enjoyed this challenging excursion.

Background

The exposed strata formed in a deltaic sequence 304-309Ma. Named the Westphalian B Coal measures. The sequences are known from much borehole evidence in addition to open casting and coastal exposures. This coast is recognised as the best exposure.

The environmental context of the sedimentation process is the outlet of a very substantial alluvial plain lying to the south of the eroding Caledonian massif. Deposition was taking place in an advancing deltaic environment of large scale, There were key distributary channels, for our purposes the environment was essentially terrestrial with rare marine incursions but much lacustrine and channel – swamp deposition. Total sedimentation reaches 900m to the south of us. This was an environment with integral erosion and redeposition. Lateral continuity of facies is restricted but the time sequence is now clear.

Factors: tropical latitude with an interpretation of monsoon type precipitation! Drifting north/ Global warming. Tectonic sinking and stretching, with sediment loading- supporting the process. Deltaic sedimentation processes will also have played a part. There were possibly 500 days in the year at this time. Coal swamps were abundant with a cyclothem type cycle of sedimentation.

A simplified sedimentary log is at the end of this report.

Site 1, a channel fill is seen. (GR339769)

This is the Charley's Garden Sandstone: a lot of shallow sedimentary structures (current and trough bedding, symmetrical and asymmetrical ripples) with coarsening up prior to a planation episode in the deposit. We see the s/s, weathered to a dark brown as the iron rich cement weathers. The jointing is widely spaced in most elements of the channel fill deposit. (Termed stacked and cluster lenses here) Note the ripple evidence helping to confirm a shallow water environment. The causal current flowed mainly in the SE to SW direction.. Coal scares indicate land originated plant (peat like?) debris whilst there are surfaces showing a heterolithic mix of debris possibly linked to an erosional phase winnowing the finer material.

The cut through the sandstone was made in 1764 by Sir John Delaval to foster the efficiency of the port. 243 cu m of rock were excavated (and sold) to make the cut which measures 9.1m wide and >16m deep. It had sluice gates at both ends to allow ships to enter, load and leave, especially when NE winds were blowing. Salt, coal and glass were key cargo. We see lots of evidence later of flints from the south, brought for the glass industry.



Interpretation of the facies and structures suggests a channel fill sequence. This fits with the evidence of older channel fill sequences we see later.

Today the area is actively being eroded with a well-formed wave cut platform in evidence.



Leaving this location we climb back to the top of the cliff and walk south to the north ramp into Collywell Bay. 339766. Note the Bay structure, a broad synform with the stack close to the centre and complex core exposures visible. The sea wall was constructed in two phases indicating the rapid erosion of soft shale beds. We are walking back in time at this stage towards the Upper Crag Point S/S. Behind the northern sea wall lies shale beds with coal seams. (top and bottom Grey above the top and bottom Yard seams) There are doleritic stringers obscured here dating from the Tertiary and associated with the Mull Dyke swarm.

Site 2. The Bay beach is coarse conglomeritic sediment rich in flints, longshore drift is active on this material with a strong southerly movement. In the sea wall note the presence of chambers that were constructed in the wall to allow study of the strata.

The lower S/S shows deformation near the fold core, with the dip steepening rapidly to a fault related dyke intrusion, which locally has natural coke associated with it. The intrusion has a classic dyke form, linear, thickness varying up to a metre with a wall structure implying some recrystallisation and hardening in places. Note the 100 degree trend and relation to the southern point of the Bay - Crag Point.

Looking west the back wall shows a very sharp contrast to site one. The shales are exposed, pale grey with much evidence of a weak structure. The pale yellow sandstone close to the top of the cliff is Permian, the most northerly exposure of this material on land. We were able to pick out stringer intrusions through the shales aligned with the axial area of the fold. Moving south the Crag Point S/S forms a strong margin; the joints in the deposit are deeply worn by the sea. We climbed out of the bay using the southerly ramp and looked back to the Bay to confirm the fold structure.

Moving south along the well used footpath we passed Crag Point safely. The coast is seen again, more linear with reduced headland forms. Note the wave cut platform of well-jointed sandstones. A significant fault lies beneath us; 10metres of movement has taken place along it. We noted the structure (northerly end of a large elongate antiform which persists to the Tynemouth area)

Passing through a small car park we took the steps down to the Bay GR345758.

Site 3. The steps allowed the shale, thin sandstone and coal sequence to be seen; equally the dip here is to the north so a walk along the cliff base brings each stratum to the HWM. (High Water Mark) The strong S/S (often described as the Lower Crag Point Sandstone) lies at the foot of the cliffs, displaying the excellent joint sets. The cliffs to the north of the steps are actively eroding causing exposures to change frequently.



MEMBERS NEGOTIATE THE Lower Crag Point Sandstone

Four coal seams are identified together with mussel bands some unusual cone in cone structures in the shales (now a little rare) Study of the bedding and its surfaces demonstrates typical cyclothemic conditions.

Turning south of the steps we see massive sandstone with a coal seam caught up in minor faults, about 110m south a rift structure is seen with a steeper northerly fault.



GORDON DISCUSSING THE COAL SEAM

On the south side of the structure fault breccia is seen, some claim to see slickensides.



The freshness of the northerly fault surface was excellent enabling the full character of the surface to be appreciated.

10m further a superb drag fold structure is seen with a coal seam highlighting the deformation. To the north side of this lies approx 7 small faults reflecting the stretching that was affecting the area. Several geological features lie in this area allowing individual observation and interpretation; we climbed up the steps to the cliff top.

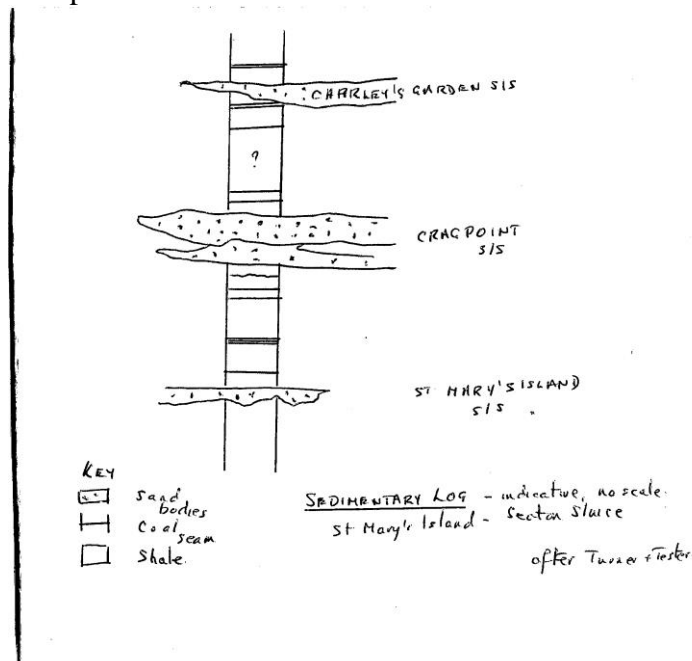
Site 4. To the south an exposure of the shales, coals and sands forms a cliff. The bedding has multiple burrow structures as does the small fault scarp to the south.



This fault allows boulder clay to come down to HWM; north of the fault some glacial drag deformation may be discernable.

Walking along the beach to the causeway the lowest channel fill s/s of our walk is seen. This is the St Mary's Island S/S. This sandstone shows sedimentary features very similar in character to the Charley's Garden sandstone seen earlier. The exposures are not as good. Nevertheless the origin is interpreted as similar. To the south of the causeway a pivot fault is seen trending ESE.

The thick sequence describes the deltaic – fluvial conditions the area experienced in the Westphalian B times.



Gordon Liddle 6.9.13

6. ADMINISTRATION

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

Best Wishes, Chris Burrige (Secretary) Tel: 01915289707