MANCHESTER GEOLOGICAL ASSOCIATION
President: PETER DEL STROTHER
Founded 1925 September 2013 www.mangeolassoc.org.uk

Dear Members,

Welcome to the MGA's September Newsletter!

We have some excellent reports on recent field trips to Earl Sterndale – Parkhouse Hill – Chrome Hill, the Derbyshire Platform, and Lymm Dam and Helsby Hill, as well as the MGA's indoor meetings for 2013/2014 and details of our last outdoor meeting.

Many thanks to all who have contributed to this edition of the newsletter. If anybody has any articles, field reports, book reviews or anything thing geological to contribute to the December newsletter please email them to me before the end of November.

James Jepson
NEWSLETTER EDITOR

MGA NEWS

If you still need to pay your subs for 2013, please could you do so as soon as possible, by sending a cheque payable to the MGA (£13 for a full member, or £15 for a full member + associate at the same address) to Niall Clarke, 64 Yorkdale, Clarksfield, Oldham, Lancashire, OL4 3AR. Any queries, call Niall on 07785778250.

We are sad to report that David Thompson, former President of the MGA and Senior Lecturer at the University of Keele, has died suddenly of a heart attack. He was an outstanding geologist and teacher of geology. An obituary has been posted on the University of Keele's website:

http://www.keele.ac.uk/gge/latestnews/2013/ggenews-davidthompson.php

CONTENTS

QUICK DIARY

Outdoor:
12th Oct - Skills Day at the Manchester Museum
Indoor:
19th-20th Oct - Joint meeting with YGS in Buxton
13th Nov - TBA
11th Dec - New Mills Mining

ARTICLES

EARL STERNDALE – PARKHOUSE HILL – CHROME HILL

Fred Broadhurst Memorial Field Trip No .4

Saturday 10th August 2013

Leader: Jane Michael

Ideal weather – a chilly start, gradually warming up to a comfortably sunny day. We followed Fred's route (Broadhurst, 2001) from Earl Sterndale, via Hitter Hill and Parkhouse Hill to an ascent of Chrome Hill, and return around Hollins Hill.

From Hitter Hill we had an overview of the ground. Hitter Hill lies on what was, in Lower Carboniferous times, the western margin of the shallow sea occupying the Derbyshire Platform and is one of a range of apron-reef limestone hills, including Parkhouse and Chrome Hills. Behind us, to the east were the Lower Carboniferous shelf limestones of the White Peak. To the west there would have been, in Lower Carboniferous times, the off-shelf basin of the Widmerpool Gulf. Later, in Upper Carboniferous times, the region subsided and the basin was infilled with mudstones and sandstones, which eventually inundated the Platform itself. The hills to the west are the remains of that infill and inundation.

On Hitter Hill, we found specimens of stromatolites in a stone wall (Photo 1). The stone may well have come from the nearby Glutton Dale quarry, excavated in reef limestones.

Photo 1 (photo by T. North)

Photo 2

Parkhouse Hill

This was our first close-up of fore-reef bedding, dipping steeply basinwards. There was no time to search for the elusive geopetal infills - the proof that the dip currently observed is original.

Chrome Hill

A strenuous ascent, but the summit offered a magnificent vantage point from which to study our area of interest.

Just across the valley to the west, lay Hollins Hill, comprised of the Longnor Sandstones of the Namurian Series, overlying the Longnor Mudstones. A spring-line along the side of Hollins Hill, marking a sandstone-mudstone junction, was very obvious (Photo 2).

Photo 3

To the southeast, an impressive view of Parkhouse Hill and beyond, Hitter Hill and other hills of the apron-reef stretching in the direction of Hartington (Photo 3).

Below, on the eastern side, lay Dowel Hall, in an 'embayment' eroded, possibly, into the limestone shelf during a period of exposure after the end of the Lower Carboniferous. The embayment is floored with the Longnor Mudstones.

To the northeast, the near-horizontal bedding in the shelf limestones was visible in the top of Hillhead Quarry.

This was an opportunity to discuss the evidence for the Chrome Hill Fault system, mapped in the area.

There was no fossil-hunting on this occasion, but a cursory look at the rocks indicated that there was potentially much to be found – as the reputation of Chrome Hill as a 'locality' attests.

We made the somewhat precarious descent off the northern end and in fact, as Fred Broadhurst warned, the cliffs on either side make the crest a risky place to be in mist or high wind.

Beyond Chrome Hill we crossed the limestone - sandstone boundary, noting the gradual appearance of more and more sandstone blocks in the walls until, rounding the northern end of Hollins Hill we were in an unmistakeable gritstone-type landscape. The hummocky ground along the lower slopes of Hollins Hill indicated much recent land-slippage.

We returned alongside the River Dove, where exposures of the black mudstones were noted.

Considerable thanks are due to Jane Michael for her reconnaissance and background work for the trip.

David Handley

Broadhurst, F.M. (2001), Rocky Rambles in the Peak District, Sigma Press, Wilmslow. 180 pp.

Report on the Southern Margin of the Derbyshire Platform

Sunday 16th June 2013

Leader: Dr Cathy Hollis, University of Manchester

This field trip examined the Lower Carboniferous (Dinantian) limestone of the southern margin of the Derbyshire Platform. The trip focused upon the area around Matlock and Wirksworth and provided the opportunity to review the facies encountered along the margin of the Derbyshire Platform with the Widmerpool Gulf, to the south. As well as examining a range of different shallow water carbonate facies, evidence for subaerial exposure and syn-depositional volcanism were assessed. The role of faults in controlling both sedimentation and subsequent diagenesis were illustrated. In particular, the importance of pre-existing (Caledonian) basement faults on providing a conduit for fluids responsible for dolomitisation and mineralisation was discussed.

Locality 1: Redhill Quarry Nature Reserve

Redhill Quarry: prominent yellow-weathering clay parting that has been mapped as the Asbian-Brigantian boundary

Locality 1: Redhill Nature Reserve (SK 275 552)

The quarry exposes the Lower Carboniferous Matlock Limestone. Initial inspection revealed horizontal bedded limestones with clay partings. Towards the base of the quarry is found a prominent yellow-weathering clay parting that has been mapped as the boundary between the Bee Low Limestone (designated Asbian in age) overlain by the Monsal Dale Limestone (designated Brigantian). The Monsal Dale rocks contained crinoids and brachiopods, with many chert nodules. Various indicators suggested an association between the clay partings and shallowing (karst features, thin beds with algal laminations, development of proto-soils, the development of brachiopod communities in muddy waters). Sea level changes were invoked to explain cyclicity and to suggest the bedded limestones be interpreted as a lagoonal facies.

The distribution of fractures were noted, with some cut out by the softer beds. This led to a discussion of tectonics: basin formation under the influence of extensional faults; subsidence (with compression); and inversion (with reactivated faults). The reactivated fractures became conduits for fluids leading to cementation and mineralisation (lead, zinc and fluorspar).

Locality 2: Harborough Rocks (SK 242 552)

From Middleton Top, the group walked along the High Peak Trail the 2 mile distance to Harborough Rocks. These rocks are affected by dolomitisation, making them porous and leading to distinctive weathering patterns. Although no body fossils are preserved, there are casts/moulds of brachiopods, crinoids and corals. Sedimentary textures can also be recognised, allowing an analysis to be made of the depositional setting.

Harborough Rocks, as viewed from the High Peak Trail.

Towards the base of the section, we found indicators of channelling and slumping, with large clasts and disordered units. This was considered to represent sediment transport from at the platform top into deeper waters. Working up the section, cross-bedded units were noted and these were suggestive of platform margin sand shoals. Further up was a prominent bed with clay, reminiscent of the Asbian-Brigantian boundary studied in Redhill Quarry.

The dolomitisation process is problematic, not least because of the immense amounts of magnesium that are required. There are two principal models for dolomitisation in the literature: the early seepage reflux model (involving the migration of highly saline fluids) and the thermal model (involving hydrothermal fluids conducted through faulted rock). The process at Harborough rocks is probably linked to the expulsion of basinal fluids from the Widmerpool Gulf along faults, but there may have also been some contribution from the volcanics. Some have argued for a Permian dolomitisation episode, but newer ideas consider the changes to have taken place in the Variscan.

Harborough Rocks: sedimentary textures in the dolomitised limestone.

Most of the geological literature on the Derbyshire limestones is pre-2000. However, our field trip leader explained that these rocks are being studied again and there are plenty of questions that can be answered only by further research.

David Tyler

Report of Field Trip to Lymm Dam and Helsby Hill

Sunday 7th July 2013

Leader: Fred Owen

On a hot and sunny Sunday, 18 members and visitors plus one small dog met up with leader, Fred Owen, in the Lymm Dam car park behind the Parish Church at Lymm. Some lucky people got to park their cars in the shade of the churchyard trees: others didn't and came back to ovens! It was one of the hottest days for a long time.

Fred started by giving us a safety briefing (we were to visit a tunnel later) and explained the programme for the day: the morning to be spent following part of the Lymm Heritage Trail before moving to Helsby Hill after lunch. He then explained the geological structure of the area. There is a general north-east/south west trend with several extensional basins formed during the break up of Pangea in Permo-Triassic times when Britain was approximately 20º north of the equator. The basins stretch around 400km from the East Irish Sea Basin in the north west to the Wessex Basin in the south. The Cheshire Basin is approx 100km long by 55km wide and covers 3500 sq km. It is fault-bound on its eastern boundary, known locally as the Red Rock Fault but laps onto the Carboniferous of the Clywd Mountains to the west. The fault throw varies from 300m in the north to 4000m+ in the south.

During formation, to the south west were the Variscan Mountains of South Wales and to the north east and east were the Carboniferous Pennines. Both provided sediment for the basin which took the form of a half-graben, the maximum depth of which has been assessed at 6km in the east, thus meaning that 2km of sediment has been removed over time. An inversion also occurred which is known as the Mid-Cheshire Ridge and that is where Helsby Hill is situated. The ridge itself goes on to the Peckforton Hills and Beeston Castle, all prominent local topographical features. The present landscape is the result of glacial erosion with deposition of till plus fluvial erosion. Glacial erratics can be found in the mainly clay till and many were used for local cobbled streets and paths.

The rocks we would be seeing were the Tarporley Siltstone Formation of the Mercia Mudstone Group and two formations from the older Sherwood Sandstone Group: the Helsby Sandstone Formation and the Wilmslow Sandstone Formation.

Lymm Dam

For the first part of the trip we followed the free Lymm Heritage Trail which Fred provided for each of us.

Locality 1 The Dam

We walked from the car park to the main A56 which was the original turnpike road over Bradley Brook. There were waterfalls and a ford until a dam was built at the top of a waterfall in the Helsby Sandstone Formation resulting in a long, narrow and quite deep reservoir, typical of a subglacial gorge. The overall depth of the gorge is ca 40 m and the depth of the reservoir is 10/20m. Beyond the dam downstream is The Dingle with its series of waterfalls cutting into the aeolian Wilmslow Sandstone Formation.

General View of Lymm Dam

Eroded Channels

Locality 2 Meltwater Channels

We then walked down the east side of the Dam (which is the name for the reservoir as well as the dam itself) to find a very strange area of exposed rock. Fred asked us to examine the heavily eroded area and see if we could work out what was happening.

Eroded Channels

There were two possible causes: meltwater channels under active ice or children on BMX bikes! The channels were almost vertically sided, narrow with a low sinuosity. There were five different levels with some channels at right angles to each other and occasional nodules seen. Seasonal differential flow rates could be made out.

What appears to have happened is formation under glacial conditions. Phreatic water (water below the water table level) had eroded channels when water had met with the rockface at the edge of the glacier. Then when the water table level had fallen, vadose (free) water had eroded channels perpendicular to first channels. We were therefore seeing two different types of meltwater channel, which it has to be said, have been further eroded by youngsters' trainers!

Locality 3 Scallops and Meltwater Basin

Further along the path, the 'river cliff' (an almost vertical sandstone outcrop) showed what appeared to be 'scallops' in the face. These were aligned with joints in the rock and are evidence of active ice sheet melting – turbulence causing the scallop shapes. The 'cliff' curved away from us and the lake into a large asymmetric grassy area which Fred explained was a basin cut by the ice into soft sediment. The meltwater then came over the hill and cut the channels we had first seen under the water table before draining back into the lake. These channels are Nye channels. Fred also then explained about different pressures within the ice and also that this glacier had been an exampled of a temperate climate glacier.

Scallops in cliff

Locality 4 The Wishing Bridge

Near the end of the reservoir we crossed the Tarporley Siltstone Formation/Helsby Sandstone Formation boundary. At the Wishing Bridge, we were on the Tarporley Siltstone Formation (TSF) which is the bottom of the Mercia Mudstone Group. Environmental conditions had changed from arid to a shallow sea. Intertidal deposits can be identified. The sea became deeper gradually, the Bakerville Sea – part of the North Irish Sea which split the Pennines from the Variscan mountains of South Wales. On the other side of the Pennines at this time was the Zechstein Sea. Whilst fairly overgrown, we did find some exposures of the TSF showing thin bedding and a definite change in lithlogy.

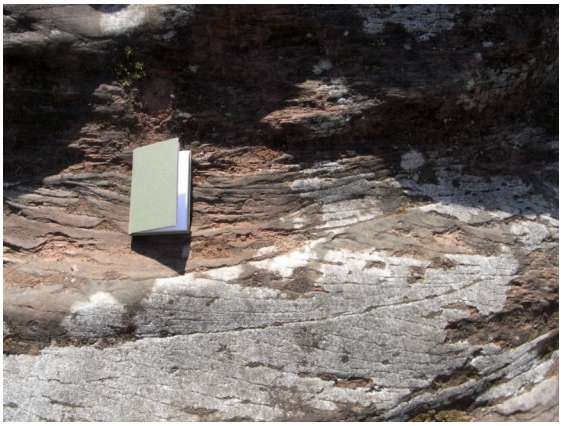
Locality 5 Crosfield Bridge

Whilst not of specific geologic interest, Crosfield Bridge was industrially interesting. The story goes that Lord Lever had built it following a disagreement over charges being made by ICI for sodium hydroxide which he required for soap making. Lord Lever decided to manufacture his own and built the bridge to bring supplies to what was going to be a new village for the workers at his new plant. ICI capitulated so only the bridge, which is now in a bad state of repair, was built.

Upstream of the bridge, Bradley Brook flows through an area of semi-ancient woodland known as The Bongs (from the French Les Bancs).

Locality 6 Lymm Cross

From Crosfield Bridge we walked along the other side of the reservoir and, crossing the A56, under The Dingle – United Utilities have quarried on one side for waterworks but we could see outcrops of the Helsby Sandstone Formation.



Base of Lymm Cross

Arriving in the centre of Lymm we found Lymm Cross. This sits on a pedestal of rock: outcrops with scallop marks and meltwater channels. Cross bedding could be seen as shown in the image. The area round the cross is made up of glacial erratics: volcanic and intrusive rocks such as basalt, andesite and granphyres which are originally from the Lake District.

At that point, the morning trip finished and we returned to the car park for lunch and later to move to Helsby Hill. A very informative morning's work!

Helsby Hill

Our numbers had diminished due to the heat but 11 of us (including Lucy, Peter Gavagan's dog) drove to a car park at Helsby Hill Quarry (SJ 491 750). This is a Regionally Important Geological Site (RIGS) within the Helsby Sandstone Formation. It is a Woodland Park and Nature Reserve within the Mersey Forest. The environment of deposition during the Permian was that of a desert with braided rivers. Thus features such as river channels, sand bars, dunes, lagoons, cross-bedding and dewatering structures are found although with so much of, particularly, the quarry walls covered in moss, seeing some of these proved difficult.

Locality 1 Tunnel

After a relatively gentle walk through cooling woodland, we arrived at a point where the quarry railway had been built. This railway travelled downhill and across the plain at the bottom of the hill to Ince Pier where it was shipped via barges to Liverpool and Birkenhead. The railway travelled through a tunnel about 5m wide and maybe 2m in height. We had brought helmets but no-one used them: it was too hot and the dog walkers we saw didn't appear to need them!

Pick marks in the quarry wall

Before we actually entered the tunnel we viewed one of the quarry walls which, if you looked carefully through the pick marks of the miners, showed some bedding planes.

Also Fred explained that when sand is deposited in arid aerial conditions in a desert, there is an angle of settlement of 30º downwind. Any 'bedding' seen at a steeper angle means there has been tectonic uplift. He also advised us that investigation of the mineralogy making up the sandstone will indicate its source. Quite a lot of it was mottled red and white. The red is due to iron but why is there this difference?

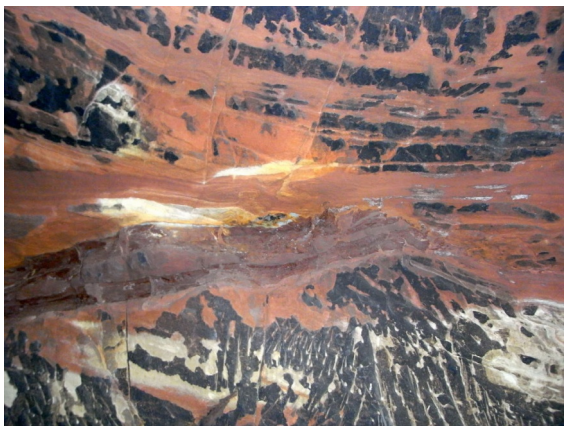
It would appear that this sandstone is the source rock for the oil and gas reserves in the Irish Sea. So it is possible that the oil and gas have removed the iron, if it was ever there. Humic acid from vegetation can remove iron too. The quarrying was mainly of hard arenaceous sandstone, leaving the much softer argillaceous material.

We could see some channel structures in the walls leading down to the tunnel entrance. There is also gypsum found in the sand dunes showing that at some stage there had been sea water around.

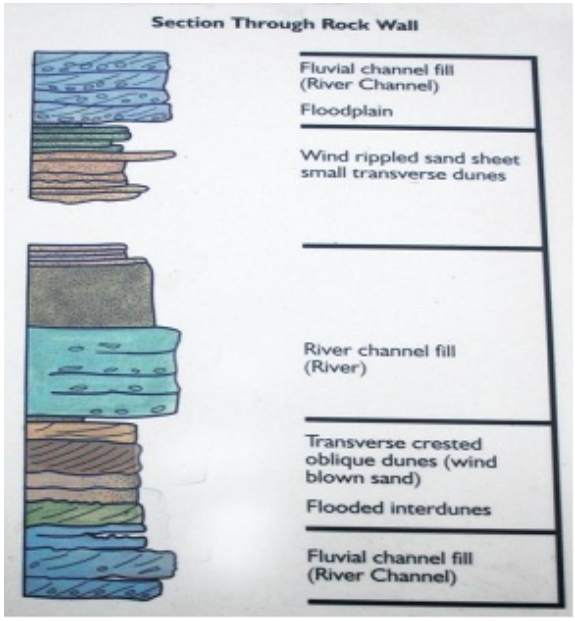
Fred then had us trying to work out how the dip of the bedding on one side of the cutting matched (if it did) the strata on the other side. This was not easy and proved inconclusive although at one point we did think we had matched it. There were a few small faults and even using them, matching either side was tricky.

The tunnel was driven through a huge sand dune although it was difficult to tell the wind direction. It was an impressive sight and gives a good 3D view of the interior of a dune.

Tunnel entrance



Tunnel Roof



Sediment Log

Locality 2 Rock Wall

As we continued our walk through the area, we saw more evidence of the braided river such as sandbars on top of soft river or lake or lagoonal sediments. We eventually arrived at a rock outcrop which has been chosen for a detailed section. Unfortunately because it is not stable, it has been fenced off.

The log clearly shows the transition from fluvial to aeolian conditions and back again (twice). From our vantage point, we could see some of this but it would have been nice to have got closer. However, common sense did prevail: there were rather a lot of loose rocks!

We walked back to the car park and then made our ascent of Helsby Hill itself. Generally this is made up of the Helsby Sandstone Formation. However, just before the summit, we crossed into the Tarporley Siltstone Formation which is at the base of the Mercia Mudstone Group. It is only a very thin section probably less than a metre thick. It is reddish in colour with larger grit in it.

The view from the top was well worth the hot climb. We could see both Liverpool Cathedrals quite clearly. It was too hazy to see Blackpool but looking south and west, the Peckforton Hills and Beeston Castle, also on the Mid-Cheshire Ridge, could be seen as well as the overall structure of the Cheshire Basin.

Although not specifically clear, there are the remains of a prehistoric hill fort. We found the ramparts on our return journey. Apparently charcoal from the site has been dated at 6000 years ago which may indicate some ritualistic use of the site in Neolithic times. It would be an ideal spot: easily defended though perhaps lacking in running water at times!

A group photo was taken of those who had lasted the whole day: it had been extremely hot – probably not unlike the Permian times when it was formed. So thank you Fred for a fascinating trip.

Jane Michael

Indoor Meetings 2013-2014

Joint Meeting with the Yorkshire Geological Society
(Saturday in Buxton Museum and The Buxton Dome)
Saturday 19th October 2013
Mineralization and Fluid Flow in the Peak District
Sunday 20th October 2013
Field Trip, Derbyshire Orefield

Wednesday 13th November 2013
T.B.A.

Wednesday 11th December 2013
Mining the Yard Seam in New Mills in the 18th and 19th Centuries
Dr Derek Brumhead MBE, Manchester Geological Association

Saturday 25th January 2014
The Broadhurst Lectures
The 'Avian Dinosaurs': Latest research on some early fossil birds
Secrets of Archaeopteryx revealed by Synchrotron Analysis
Dr John Nudds, University of Manchester
The Gliding Flight of Feathered Dinosaurs and the Evolution of Bird Flapping
Dr Gareth Dyke, University of Southampton

Wednesday 12th February 2014
Quicklime, Cement and a Short History of Quarrying
AGM followed by Presidential Address
Peter del Strother MBE, Manchester Geological Association

Wednesday 5th March 2014
Joint Meeting with the Geographical Association
Living in Europe's Supervolcano: Volcanic hazard and emergency management in the Bay of Naples
Dr Martin Degg, University of Chester
Roscoe Building, Lecture Theatre B, 6.30pm

MGA Meetings are held in the Williamson Building, Oxford Road, opposite The Manchester Museum, unless otherwise stated.

Outdoor Meetings 2013

Skills Day at Manchester Museum
Saturday 12 October 2013
Leader: David Gelsthorpe
Time: 10am – 3.30pm
Description:

Fossil Drawing Masterclass:
Participants will have the opportunity to draw and label trilobites, bivalves and brachiopods from the Museum's collection. Use of technical terms and identification guides will be discussed.

Understanding and Interpreting Fossils:
Participants will investigate three of the most common fossil assemblages in the UK. They will be guided through identifying the fossils, interpreting the environment and using the specimens to date the assemblage.

Understanding Quaternary Climate Change in the UK:
Participants will investigate a range of rocks and fossils from the Last Ice Age. Using graphic logs, isotope and pollen data, they will be guided through interpreting the changes in climate at this time.

For further details and booking for any of the above events contact Jane Michael.

Other Societies and Events

Manchester Geological Association members are welcome guests at other societies' events, some are listed below:

Black Country Geological Society (www.bcgs. info):

Sunday 20th October (Field Meeting): Charnwood Forest, Part II, leader Mike Allen.

Monday 28th October (Indoor meeting): 'Of fossils and fracking - a palaeontologist's guide to shale gas'. Dr Liam Herringshaw

Saturday 2nd November (Conservation day) 10am: Clearance at Himley railway cutting. Directed by Steve Gallis, Baggeridge Country Park.

Monday 9th December (Indoor meeting, 7.00 for 7.30 start): BCGS Members' Evening and Christmas Social.

Contact: Andrew Harrison – andrew_harrison@urscorp.com

Cumberland Geological Society

Wednesday 19th October (Indoor Meeting): Recovery of timescales of volcanic processes. Dr. Daniel Morgan, University of Leeds.

Wednesday 13th November (Indoor Meeting): An assessment of the process of hydraulic fracturing or "fracking". Prof. Pete Styles, Keele University.

Wednesday 11th December (Indoor Meeting): Members evening.

Lancashire Geological Association (www. lancashiregeologists.co.uk):

Contact: Jennifer Rhodes – s_f_rhodes@hotmail.com

Leeds Geological Association (www. leedsgeolassoc. freeserve.co.uk):

Thursday 10th October (Indoor Meeting): Quaternary Palaeoenvironments in Southern Arabia: the Geological Record in the UAE and its Implications for Human Migration. Dr Andy Farrant, BGS.

Saturday 2nd November (Indoor Meeting): Carbonate Rocks - Joint Meeting with the YGS.

Thursday 7th November (Indoor Meeting): Geological Characterisation of Groundwater Aquifers for Resource Protection. Dr Jared West, University of Leeds.

Thursday 5th November (Indoor meeting): AGM and Conversazione – Short Talks and Displays by Members.

Contact: Anthea Brigstocke – anthea.brigstocke@zen.co.uk

Liverpool Geological Society (www. liverpoolgeologicalsociety.org.uk):

Contact: Joe Crossley – 0151 426 1324

Tuesday 8th October (Indoor Meeting): Presidential Address. Prof. Silvia Gonzalez

North Staffs Geological Association (www.esci.keele.ac.uk/nsgga):

Thursday 10th October (Indoor Meeting): Skeiðarárjökull. Dr Richard Waller, Keele University.

Thursday 14th November (Indoor Meeting): Where the woolly rhinos roam: vertebrate faunal and environmental change during the last ice age. Prof. Danielle Schreve, Royal Holloway.

Thursday 12th December (Indoor meeting): The Christmas Social.

Contact: Eileen Fraser – frasers@netfraser.me

Oldham Geological Society:

Contact: Jo Holt – 01457 874 095

Open University Geological Society North West Branch (www.ougs.org/index.php?branchcode=nwe):

Contact: Jane Schollick – 01704 565 751

Russell Society (Mineralogy) (http: //www. russellsoc.org/nwbranch.html):

Saturday 6th October (Outdoor Meeting): NW Branch visit to Grovebeck Mine, Grinton, Yorks. [SE 028 968]. Limit = 12 people. Leader Ian Dossett.

Friday 14th December (Indoor Meeting): NW Branch Christmas Meal.

Contacts: Alan Dyer – Aldilp@aol.com or Harry Critchley – 01204 694 345

The Manchester Museum:

Rock Drop: Geology identification sessions

Thursday 26th September: 14:00 – 15:00

Thursday 24th October: 14:00 – 15:00

Thursday 28th November: 14:00 – 15:00

Behind the Scenes at the Museum – Geology and Fossil Focus

Saturday 9th November: 10:00 – 16:00

Website: http://www.museum.manchester.ac.uk/whatson

Wilmslow Guild (www.wilmslowguild.wikidot.com):

Tuesday 22nd October (Outdoor Meeting): Geology of Nottingham and visit to the British Geological Survey, Keyworth. Leader Dr Christine Arkwright.

Monday 19th- Saturday 24th May 2014: Residential trip to the Island of Arran – More details of costs and itinerary will be available later in 2013. Please register your interest now.

Contact: Wilmslow Guild 01625 523903

For more details on any of the other societies listed please check their websites