

Cymdeithas Daeareg Gogledd Cymru
North Wales Geology Association

NEWSLETTER

Issue 79

October 2013

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Front Cover Image:

This beautifully preserved cartilaginous fishes tooth comes to us courtesy of Peter Appleton. More on this find is described inside.

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Chairman's Message

Every other year, in the early autumn, there appears in the geological calendar one of my favourite events - the PESGB Africa Conference. It is organised by the Petroleum Exploration Society of Great Britain in conjunction with the Houston Geological Society and takes place alternately between Houston and London. Unlike other events organised by PESGB, it is not dominated by the global geophysical prospecting and processing companies, but draws a large crowd of enthusiastic people to discuss and inform on the subject of the (petroleum) geology of Africa. It is also a great opportunity to meet old friends, and it is a standing joke that I must travel to 'Africa' to meet our erstwhile chairman and newsletter editor Rob Crossley.

It is great opportunity to become immersed for two whole days in geology as it was never known when I was a student, because any aspect of the ancient or more recent geology of the continent that may result in the accumulation or generation of petroleum is up for discussion. Most of the continent of Africa has passive margins, but of course in the north-east there are the 'modern' rift valleys and very active tectonic, volcanic and igneous processes leading to new ocean-floor being generated. It is the seismic cross-sections that are most exciting, laying bare the succession of strata that record the subsidence of part of the ancient continent of Gondwana, the filling of that depression by sediments of continental origin, the intermittent flooding by seawater to create massive evaporite deposits, the balancing of continuing subsidence by the deposition of marine strata and the ultimate tearing

asunder of the whole shooting match to create a new ocean between what we know today as Africa and South America. And all this fantastic research is paid for by the filling-up of cars, lorries and buses with petrol or diesel, the consumption of oil and gas for heating our homes, and the use of both to generate electricity for our computers so that we can read, write, process and store the information which is gathered. The capitalisation of all that knowledge in company balance sheets and investment funds is what keeps the World's finances humming, but if we are to do as we are told and stop using fossil fuels then it is all worthless (and so are our pensions and investments). So it is easy to see why there are powerful forces at work, and I don't mean geological ones, when we discuss global warming and the responsive atmosphere and oceanic processes at the surface today. My own defence is that half of my time is spent analysing clays for brick and tile manufacturing, synthetic materials from apatite to zircon and a fair amount of industrial aggregates, fly ash and even 'equestrian' sand. You can look the last one up for yourselves, but it is only sediment after all, and sedimentology is an honourable and long-lived geological sub-culture - albeit with unexpected repercussions for horses.

This is also the time of year when we look forward to the Annual General Meeting. The details are still being thrashed out as I write, but one thing is certain, and that is that we will no longer be served by Cathy O'Brien as Meetings Secretary. Cathy was one of the volunteers who revitalised the Association at the 2011 AGM, and she has always stated that it would be for an essentially 'fixed' term. Now, the pressure of work, which has included the upheaval

of the merger of the Countryside Council and Environment Agency for Wales and a regular commute to work in our distant capital of Cardiff means that she is no longer able to continue the additional commitment to the Association. We must thank Cathy for her work on our behalf over the last three years. In the meantime, we must now find a replacement lest we return to the dark days when we suffered a more hand-to-mouth existence of meetings arranged at shorter-than-ideal notice. If anybody would care to step forward, please contact me before the AGM for any discussion.

You will see that our November meeting has been put back by one week, to enable a full programme of presentations to go ahead as planned. Most of the committee and the presenters on the night still work full-time, and from time to time absences and commitments come up at short notice which cannot be avoided, so it was decided that moving the meeting was the lesser of the evils, and we hope that you are not inconvenienced. We look forward to another great year of geology in 2014.

Jonathan Wilkins

Articles:

Fishy remains from the Carboniferous Limestone

My New Year's resolution, as always, was 'to be organised' – of course never achieved. During this year's first task, sorting out the archaeology of the garage, a disintegrating cardboard box revealed a mice nest of shredded newspaper along with little parcels labelled 'Minera, Upper

Grey Limestone'. After decontaminating in warm Dettol solution, one sample particularly caught my eye.



Copyright: Peter Appleton

Careful excavation of the shiny black plate-like fossil was attempted with a large needle and small hammer. A tap too hard caused the 'mystery' object to leap from the rock as clean as a whistle; see picture. (LH specimen and front cover)

Unlike anything I'd seen before, a description in Zittel, confirmed it to be a shark's tooth *Petalodus sp.* (prob. *P. acuminatus*) The sample was from a lead mine dump so the immediate context is unknown, though the associated brachiopod fauna is typical of the 'Cefn Mawr Limestone Formation' within which the mine was known to be worked. (I still prefer Morton's 'Upper Grey Limestone'!) The site has been revisited on a couple of occasions but alas no further tooth finds yet.

Creating variety in my local dog walking, I searched recently for a new Cefn Mawr/UGL, trilobite site; 'Maddy' is still

only partially trained in fossil-finding as yet. The former site, located within one of the old limestone quarries at Trevor, Llangollen, is now irretrievably buried by a caravan-park garden. However, within

half an hour, two small sharks' teeth were found in the debris from a nearby quarry. Enthused, further visits were made, but produced no more.



Copyright: Peter Appleton

One specimen (middle in picture) is quite damaged, but is similar to the Minera specimen with a smooth cutting edge. The (RH and above) tiny example has a serrated cutting edge possibly *Petalodus serratus* ?

Reference

Zittel, K.A., (1932), "Text book of Palaeontology", Macmillan, London.

Peter Appleton

Extract from "How Green was my Valley?" by Richard Llewellyn

"The first thing I saw was the slag heap.

Big it had grown, and long, and black, without life or sign, lying along the bottom of the Valley on both sides of the river. The green grass, and the reeds and the flowers, all had gone, crushed beneath it. And every minute the burden grew, as cage after cage screeched along the cables from

the pit, bumped to a stop at the tipping gear, and emptied dusty loads on to the ridged, black, dirty back.

On our side of the Valley the heap reached to the front garden walls of the bottom row of houses, and children from them were playing up and down the black slopes, screaming and shouting, laughing in fun. On the other side of the river the chimney pots of the first row of houses could only just be seen above the sharp curving back of the far heap, and all the time I was watching, the cable screeched, and the cages tipped. From the Britannia pit came a call on the hooter as the cages came up, as though to remind the Valley to be ready for more filth as the work went on and on, year in and year out.

'Is the pit allowed to do this to us Mr Gruffydd?' I asked him.

'Do what my son?' Mr Gruffydd asked.

'Put slag here' I said

'Nowhere else to put it, my son,' he said. 'Look up by there at the top of the mountain, by the Glas Fryn. There are the daffodils, see.'

And indeed there they were, with their green leaves a darker sharpness in the grass about them, and the yellow blooms belling in the wind, up by the Glas Fryn and all along the Valley, as far as I could turn my head to see.

Gold may be found again, and men may know is madness again, but no one shall know how I felt to see the goldness of daffodils growing up there that morning. The Glas Fryn was the nearest place to our house where they grew. It was later that I pulled bulbs to grow in our garden,

*but the garden was so small, and the earth
so blind with dust from the slag that they
gave up trying and died.*

*But that morning Mr Gruffydd put me
down among them all, close to them,
where I could take them in my hands to
breathe the cool breath of them, and give
thanks to God.*

*Below us, the river ran sweet as ever,
happy in the sun, but as soon as it met the
darkness beneath the sloping walls of slag
it seemed to take fright and go spiritless,
smooth, black without movement. And on
the other side it came forth grey, and
began to hurry again, as if anxious to get
away. But its banks were stained, and the
reeds and grasses that dressed it were
hanging and black and sickly ashamed of
their dirtiness, ready to die of shame they
seemed, and of sorrow for their dear
friend, the river.”*

Reference:

Llewellyn, R. (1939),”*How green was my
valley*” Michael Joseph, London

Discussion:

“What are these then?” Issue 78 by Lyn Relph

Keith Nicholls writes:

The end member of pyrite oxidation is a pale / yellow hydrated sulphate mineral called copiapite. My guess is this is a weathering front of copiapite moving away from a pyrite framboïd (possibly still present as a pseudomorph?) at the centre of the ring.

Barry Wrightson writes:

“*Shades of Grey in the Virtual Darkroom*”

When faced with the mystery circles image provided by Lynn I found myself looking at a collection of photographs of fossils which were essentially grey images on a grey background. Nevertheless, I thought I could make out some slight detail. The white circles were not full circles, but rather an arc, and with something inside it.

To make things a little easier for me, I normalised the initial image, which brought up the visibility of the "arc with something inside it". Normalise is, of course just a magic word.

Basically the image had a lot of flat, low visibility, grey detail in the middle, between the white and black; by reducing gamma, we steepen the sigmoid contrast curve (the tangent of the slope is called gamma) and in the mid-range, the small differences in the middle greys which are not all that visible are been exaggerated to give a contrast range which is closer to the optimum ("normal") for human eyes to perceive. During this process no new data is added, just the small mid-range differences made more obvious. No fake data, just a mathematical transform. All the old pixels are still there, and no new ones.

In my old days, when I made money in the dark room with old fashioned wet photography, it would have involved increasing the ratio of hydroquinone to metol in the developer and using a longer cooler development to produce the print. This is not a process for people's faces, the process reveals every tiny blemish, but industrial photographers find beauty in revealing the tiny flaws. Of course the modern electronic camera is set up with a bias to give "good" people faces, and tones down the ugly details. It tends towards the "Soft".

In the darkroom of my computer, under the virtual red safelights of my Photoshop programme, I can still work the old magic. It is mathematics now, rather than chemistry, but the transform makes the image Hard. When I apply the algorithms there is clearer mid-range detail. Not new, but merely made clearer to the human eye and the content within the white arcs now shout "horseshoe crab!" to me.



Original Image Copyright: Lyn Relph

The arcs of the circles are perfectly round, I have a suspicion that they may be small *Euproops rotundatus*; The clue is in the name.....

So, to complete the image, and provide an example for comparison, I then scanned and dropped a scaled, but not distorted, image of the Late Carboniferous horseshoe crab *Euproops rotundatus* on to the original image using Photoshop to align the fossil in a

translucent overlay. Comparison can now be made between the arcuate white markings and the horseshoe crab shape shown in its lighter rectangle.

Lyn Relph replies:

I have looked again at the fossil and it appears that the 'tail' is on a different lamina to the 'body'. The 'body' part of the fossil is very finely ribbed which suggests to me that it is of plant origin.

I have attached a new close up. See what you think.



Copyright: Lyn Relph

Keith Nicholls writes:

The more I look at the close up image that Lyn supplied (above) the more I am tempted by Barry's assertion that we may be looking at the head of a limulid (or something similar), but that (if we are) we must be viewing the underside of the hypostome. Do we perhaps even see evidence of some sort of appendage (ringed in red on the subsequent enlargement). Still doesn't preclude the possibility that the pale colouring is a weathering effect from pyrite, as that may well be the direct result of

sulphur loving bacteria associated with the taphonomic conditions associated with the particular mode of preservation.

The jury is still out as far as I am concerned as to what exactly the fossil is that we are looking at, and hope that one or two of these specimens might appear at the Members' Evening.



Original image copyright Lyn Relph

Peter Appleton writes:

“More from the Marsh.”

Just a note relating to two contributions in the last issue (No 78) of the Newsletter.

Firstly concerning Lyn Relph's 'whitish circles'. This is a common feature of shale weathering on colliery dumps, where the finely dispersed sulphide in the sediment begins to oxidise. The iron sulphate, so formed, nucleates at tiny discontinuities within the laminations of the shale, fossil debris etc, hence the white rings, and though soluble, is trapped within the material until the geologist happens along and bashes it !

While wandering (or getting lost!) within the wetlands of Malltraeth Marsh several colliery dumps from former workings in the Anglesey Coalfield were located. For the most part vegetation had long since taken over and interesting material was in short supply. Around the old Berw Colliery site the RSPB had recently (~3-years ago) done extensive work creating new ponds, turning over and using dump material as infill; unfortunately re-interring most of it under clayey pond dredgings.



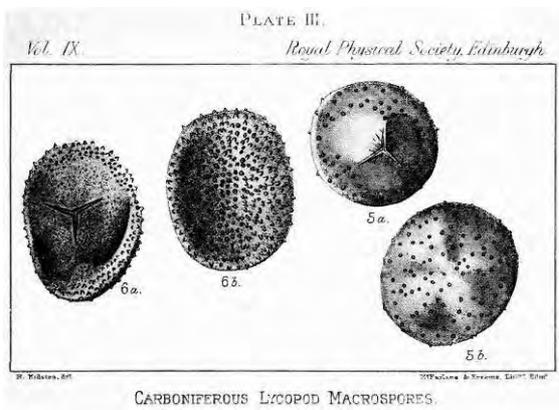
Copyright: Peter Appleton

The fossil content in what little remained exposed was unspectacular, comprising plant debris, fish debris, rare crushed non-marine bivalves and lots of 'shiny discoidal objects', some 1mm+ in diameter, with tubercular ornamentation' as shown in the photo above. Such fossils are very common in coal measures sediments and have been described as 'megaspores' or 'macrospores' for some little while; see the illustration (above) from a paper by James Bennie (of the Geological Survey of Scotland and Robert Kidston read to the Royal Physical Society of Edinburgh in 1886.

I note that the Berw megaspores bear a close resemblance to Barry's 'ostracods' and wonder if his diagnosis is perhaps mistaken?



Copyright: Peter Appleton



Subsequently the sites north east of the A5 were examined without any great success though a few fragments of shale, from a very overgrown dump sandwiched between the old and new roads, produced the megaspores in the picture above.

Reference:

BENNIE, J. and KIDSTON, R. 1888. *On the Occurrence of Spores in the Carboniferous Formation of Scotland*. Proceedings of the Royal Physical Society of Edinburgh, 9, 82-117.

Barry Wrightson replies:

I remain reasonably confident of the identification as ostracods. The trilete markings of the spores are absent, and the flat hinge line is present.

<http://planetearth.nerc.ac.uk/news/story.aspx?id=697> has a nice image showing the internals of the crustacean, which I have superimposed on one of my images which has some possible similar internal detail.



Copyright: Barry Wrightson

USGS professional paper 848-G has some nice images*.

If any of the whitish circles were actually circles, I might be more convinced.

Below is another image, with two "ostracods" and a "macrospore" showing, I hope, the difference, as I see it.



Copyright: Barry Wrightson

There is still material which might be construed as "interesting" to be found (see the attached image showing the internal skeletal structure of a fish fin). You just need to be lucky.

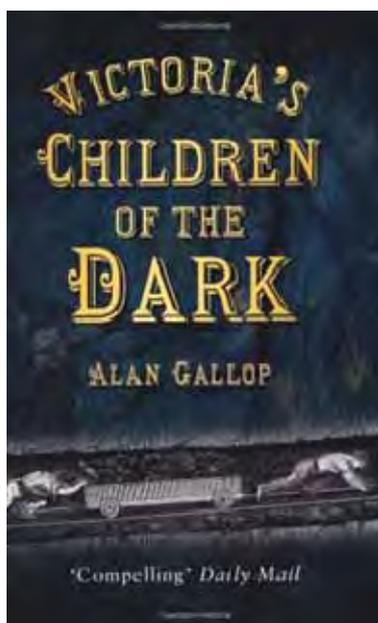


Copyright: Barry Wrightson

*Editor's Note – Unfortunately, not while the US civil service is in shut down mode.

Book Review:

“Victoria's Children of the Dark”



On the 7th July 1836 the mining village of Silkstone, situated on the outskirts of Barnsley suffered a terrible mining disaster. The area was affected by a significant storm which put the fire out of the boiler for the Huskar Pit which prevented air from being circulated through the mine and people to be brought to the surface via the pit head shaft. A group of children decided to leave the mine through the drift entrance. As they went through the last gate the drift entrance became engulfed by a surge of overflow water from the ditchline at

the mouth of the drift. Twenty six children between the ages of 7yrs and 17 yrs (with an average age of 10yrs) perished. This disaster was brought to national attention through the press, and started a chain of events which resulted in a thorough investigation into the life styles and working conditions of people who worked in the collieries in the UK, leading to the emancipation of children and women from the pit.

This is a very well written account of how women and children were made to work in very challenging conditions caused by a poverty trap instigated by the Colliery owners. It had been noted that the conditions worked by children and women colliers were worse than those of Afro-Caribbean slaves, convicts and the residents of workhouses. This book also took on (for a small part) the story of one of the families directly affected by the tragedy in the days leading up to the disaster, as well a very good account how several privileged philanthropic peers entered the lives of colliery workers and eventually changed working practices.

This is a very useful text for geologists who both want to know the geometry of mine workings as well as important historical information about the coal industry. I would strongly recommend this book, thoroughly enjoyed the read and it was difficult to put down.

This can be bought from good high street bookshops and the Mining Museum in Overton West Yorkshire.

National Coal Mining Museum, Caphouse Colliery, New Rd, Overton, West Yorkshire WF4 4RH

Reference: Gallop,A., (2010) *“Victoria's Children of the Dark”*,The History Press, ISBN-10: 0752456989

Nik Reynolds

Abstract:

Member's Evening Wednesday 13th November 2013

“Show & tell” session – ranging from “bring a rock” to mini-lectures – contributions offered to date (perhaps sub-titled “What we did in our holidays”):

“Geoliday in Loughshinny and Kerry” – Lyn Relph

“Recent volcanic events in the Canaries - submarine eruption near El Heiro in 2011 -12” – Cathy O'Brien

“Carboniferous shallow marine and terrestrial Volcanism – Gullane, Scotland” – Keith Nicholls

“Galway Granite – ancient and modern” – Jonathan Wilkins

There will be a digital microscope (or two) available for those wishing to show features smaller than the usual.

Reports:

North Wales Geology Association

Thursday 26th September 2013, University of Chester, Binks Building

“A Journey to the Burgess Shale”

Dr Jacqui Malpas

The introduction to the second annual joint meeting with the North Western Group of the Geological Society of London was made by Nik Reynolds of the GSoL who introduced Dr Jacqui Malpas describing a trip made last year to the Burgess Shale in British Columbia. Initial concerns that the lecture hall was perhaps a little too big were dispelled as a diverse, but significantly larger than normal, audience of 50 or so filtered in to the room.

Jacqui's talk was expertly delivered, covering aspects of the journey in (12 hours round trip on foot), the steps taken to protect the outcrop,

aspects of the geology of course, including elements of stratigraphy, taphonomy, palaeoecology, historical geology and evolutionary theory. Unfortunately, if the rest of the audience were like me, much of what was being said was lost as the images of these (more than) 500 million year old soft bodied fossils were shown.



Marella splendens (image copyright Joanne Conway)

Exquisitely preserved, delicate creatures, representative of one of the Earth's earliest fully functioning ecosystems came one after another – *Hallucigenia*, *Anomolacaris*, *Opabinia* and my particular favourite Walcott's “lace crab” *Marella splendens* (see image above).

The Burgess Shale is one of those truly remarkable *Lagerstätten* that crop up occasionally in the fossil record to tease us with images of what has been lost to weathering, erosion, metamorphism, folding, faulting and all the other processes that make the fossil record such an imperfect record of past life history. It ranks alongside the Solenhofn Limestone and Rancho de la Brea, but surely, on account of its antiquity, must be considered first among equals. For those wishing to follow up the talk Jacqui recommended Stephen Jay Gould's “*Wonderful Life*” and the “*Burgess Shale Primer*” which is available on line FoC.

Our Chairman, Jonathan Wilkins, supervised the Q & A session which followed the talk, and offered his thanks on behalf of all those present to Jacqui for her time and effort. JW also seconded the recommendation regarding Gould's wonderfully readable book.

Both the GSoL and NWGA are coming to enjoy this annual gathering, and it is hoped that we can continue to get together again in the years ahead.

References:

Gould SJ, (1989) "*Wonderful Life: The Burgess Shale and the nature of history*", Penguin Books.

Caron J-P and Rudkin D eds. (2009) "*A Burgess Shale Primer*", The Burgess Shale Consortium, available on line at: http://www.rom.on.ca/sites/default/files/imce/burgess_shale_primer.pdf

(At 33 Mb this takes some time to download).

KHN

Geoscience Wales

11th July 2013 "*Great Orme Field Trip*"

The evening was perfect for a field trip, sunny, warm with plenty of company. This was a very well attended trip, and started at the top of the Great Orme. Geoscience Wales very kindly provided a coach to take us straight back down to the bottom of the Orme to start our field trip the basal units of the sedimentary succession, at the car park (by the pier on Happy Valley Road) These comprise the Llanarmon dolostone limestone with many crinoids and corals. The tour was then taken to the relatively thin Tollhouse Mudstone Beds, then to the extensively worked Leete Limestone Formation, followed by the Loggerheads Limestone Formation. The majority of the discussion regarded the

perceived depositional conditions which formed this massive succession of sedimentary strata, the stratigraphical importance of the non-limestone strata and the presence of regression/transgression features.



Dolomitic limestone along near the pier.



Quarried Leete Limestone Formation by Marine Drive.



Marion leading the tour looking at the extensive Loggerhead Limestone Formation.

We then had a steady trek up the Orme to find the Craig Rofft Sandstone Member, as well as the elusive mountain goats (which were

stunningly silhouetted along the crest of the Orme. Just beyond the sandstone unit, an exposure which appeared to show possible paleosols and dewatering structures were examined.



Elusive Great Orme wild goats



Craig Rofft Sandstone Formation



Dewatering and slumping structures within sandstone

The tour was then taken to the midway station of the Orme where we could see the industrial architecture of the various ages of surface mining and then to the Cefn Mawr Limestone Formation at Bishops Quarry, with significant

sized brachiopods and bivalve fossils. The final exposure viewed was the chert-rich Red Wharf Limestone formation just behind the summit car park.

The field trip ended with a fantastic sunset over the Irish Sea with phenomenal views to Anglesey and Blackpool, then for a well deserved pint at the Kings Head public house.

Many thanks to Marion for leading this fieldtrip, and to Geoscience Wales for the provision of the coach.



Red Wharf Limestone Formation at the top of the Great Orme

Nik Reynolds

All images copyright Nik Reynolds

Editor's Note: Nik's report should have been included in the previous edition of the Newsletter, but images and text became separated – apologies.

Thursday 19th October 2013

“Integrated petroleum systems & play fairway analysis in a complex Palaeozoic basin: Ghadames – Illizi Basin, North Africa”

Royal Cambrian Academy, Conwy

Dr Richard Dixon, BP

A full house of 30 or so gathered for the first of GSW’s Cluster Meetings in the Royal Cambrian Academy. It was worth the trip just for art display – some wonderful local landscapes on display. Nevertheless it was the talk that was of primary interest to the audience. Richard Dixon described the geology of the highly productive Ghadames–Illizi Basin, a petroleum province (with a long exploration history) that straddles the borders of Algeria, Libya and Tunisia. Recent finds in all three countries suggests that it will continue to provide attractive exploration targets for some time yet. Two major petroleum source rocks of different geological age are present (Lower Silurian and Upper Devonian) and both have generated significant volumes of hydrocarbons.

Multiple reservoir–seal combinations are presented by Late Ordovician glaciogenic sediments (my ears pricked up at this point) and younger Silurian through to Carboniferous sequences. Understanding of the complex burial history of the basin (uplift, deformation, erosion) allows the capture of the stratigraphic and structural complexity.

All in all a good start to the autumn series of Cluster Meetings.

Reference: Petroleum Geology Conference series 2010, v.7; p735-760 (available through the Lyell Collection).

KHN

Dates for Your Diary:

NWGA: Evening Lectures

Wednesday 13th November 2013

“Member’s Evening” – a series of 15-20 minute presentations by our members and friends on all things loosely geological (see Abstract elsewhere)

Unless noted otherwise arrangements for NWGA evening meetings are as follow:

Pensychnant, Conwy 7:30PM (committee meeting before hand at 6:15PM – all members welcome to attend).

Saturday 25th January 2014

“Annual General Meeting” – Agenda to follow...

Followed by a Guest Lecture (Details to be confirmed)

Geological Society of London – North West Regional Group

Thursday 21 November 2013

“Assessment and Design Mitigation for Rockfalls in Quarries”

Thomas Clifford

Williamson Lecture Theatre, Manchester University.

Thursday 5th December 2013

“Underground Bridgewater Canal System in Northwest Manchester”

Glen Atkinson

Williamson Lecture Theatre, Manchester University

Manchester Geological Association

Saturday 16 November 2013 - The Broadhurst Lectures

“Geology in the Sun - The Mediterranean Islands”

Wednesday 11 December 2013

“Mining the Yard Seam in New Mills in the 18th and 19th Centuries” - Dr Derek Brumhead MBE

Details available from the Society’s web site at:

<http://www.mangeolassoc.org.uk/indoormeeatings.htm>

Liverpool Geological Society

**Tuesday 29th October, - 7:30PM, Byrom Street
Lecture Theatre, “The LGS in Iceland, 2013” Dr
Chris Hunt**

Details available from the Society’s web site at:
[http://liverpoolgeologicalsociety.org.uk/index
.php](http://liverpoolgeologicalsociety.org.uk/index.php)

Prifysgol Glyndwr University

**6th November. Nick Whitehead Lecture
Theatre, Glyndŵr University, Wrexham, 6.30
for 7.00pm start.**

*“Failure of Anchors at Glyn Bends and Bridge
Foundations on Silt at Pont Melin Rûg: two
examples of geotechnical challenges at the A5
Trunk Road in North Wales” Sergio Solera,
Associate, Arup Geotechnics.*

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