Cymdeithas Daeareg Gogledd Cymru

North Wales Geology Association

NEWSLETTER

Issue 88

July 2015

Inside this issue:

Front Cover Images:

Mud drapes overlying rippled siltstone gives rise to an unusual weathered surface in the latest Ordovician Yr Allt Formation, Pendinas Lochtyn, Ceredigion.

Articles correspondence etc to Newsletter Editor: Keith Nicholls 07442 495534 keithhnicholls@gmail.com

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Chairman's Message

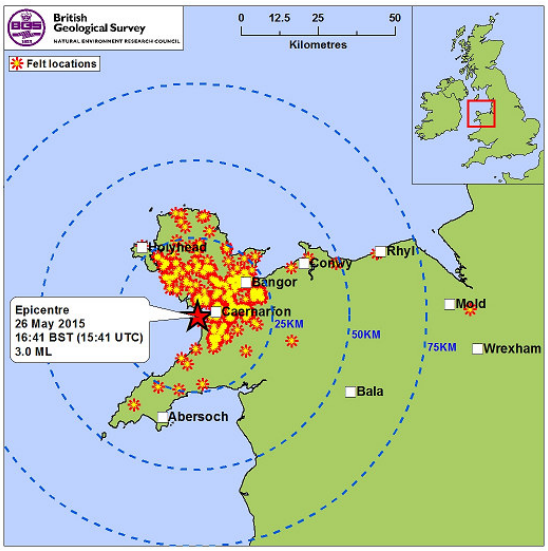
Well, the Summer field season has already been and gone for the Association - leaving the way clear now for everybody to disperse and do their own thing. We have enjoyed two stimulating days in the field over the last month, and by the time you read this, I shall be just about as far west as it is possible to go in Europe, nestling on granite intruding a metamorphosed volcanic arc complex near Slyne Head in Connemara. That is always assuming that I am not stopped at the border as a spreader of wild gossip and fear regarding imminent inundation.

In addition to the two days with our Association, I have had the pleasure of leading a party from the Open University Geological Society, and will before my holiday be showing the Deganwy History Group around a more ancient heritage than is their normal fare. The point of this thread being that we are fortunate to live in an area of great geological interest, and the study of geology is absolutely best conducted in the field.

Meeting reports are included in this edition, to which I can add two comments relating to weather.The June field meeting commenced by Llyn Ogwen, and it was the first time that I can ever recall setting out in gloom beneath low clouds threatening rain, receiving rain while driving along the coast and arriving to find the edge of the clouds hovering over the Llyn, and thus BETTER weather in the mountains than in 'Sunny Deganwy'. The July meeting started well, though with a promise of heavy and potentially thundery rain in the early afternoon, so that Keith published a weather warning advising of the danger of lightning at high altitude. We were not affected by lightning, but two walkers in the Brecon Beacons were killed by strikes during the same episode, which highlights the real risk of such conditions. The rain was definitely for connoisseurs, however, and tested our wet-weather gear very thoroughly. It was galling that as we regained the shelter of our cars the sun and blue sky was returning, and after a lovely drive home I was left wondering if it had all been a dream. Part of the attraction for me was that I had never visited the area at all previously, so it was also a good introduction to one of Mid-Wales' scenic gems. My son, a keen cyclist, was so impressed by the possibility of a lift to a legendary climb that he tagged along as well and attained the kudos of surmounting Bwlch y Groes on two wheels, clocking up 72 miles by the time he arrived home some time before me.

An interesting event on 26th June, at 15:41:03h was a magnitude 3.0 earthquake centred 9km below Caernarfon, which shows that the major faults which control so many local geological features (Snowdon

Volcanic Corridor etc.) have not finished their job yet! I was driving near Chester at the time, but my wife, who was out gardening, experienced a long rumbling which she imagined was thunder, but at the same time not like thunder.



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There was much excited reporting, and a 'felt report' (see above) by phone from an interested correspondent in Llanberis who found our Association on the web and wanted to report the earthquake and its supposed effects. In particular, he described rock falls and the 'sudden' disappearance of water from Sinc Harriet, or Dali's Hole which is a well-known lake in Dinorwic Quarry. I was intrigued and immediately contacted a member in the area with a long history of interest in the quarry, and it was duly reported thus: "I've just popped up to Sink Harriet and have had a chat with the guys working there on the electricity cables, and they say that it's been dry for quite some time - they didn't notice any change yesterday. It's been draining out over the past few years and is now frequently empty. I haven't seen it more than half-full for a couple of years or so." Which all goes to show that you have to be careful with observations taken over a short or erratic timescale? My wife was persuaded to submit a 'felt report' to the BGS, so the record of the earthquake actually has a 'star' in Deganwy for record. Sweet!

Coincidentally, cycling took me to Llyn Peris (not by bike, I must add) the other weekend, and the low water in the reservoir meant that rock outcrops on the steep, eastern bank were well exposed. Not only are they obviously glacially-scoured, but carry a fantastic record of striation by the glacial bed-load, the fine-grain of the mudstones acting as a great substrate for detail. Not only that, but there are two very obviously different orientations recorded, which suggests separate and disparate glacial regimes at the time. Caution: the banks of Llyn Peris are on private land, unlike much of Dinorwic Quarry, and the rocks in question are locally perilously slippery, with sub-vertical slopes dropping straight into deep, cold water so this is not an endorsement of the locality as a visitor attraction.

With that in mind, I shall end this piece and wish you well for the summer - and look forward to seeing you all again when our programme,

which is already shaping-up well, re-commences in the Autumn.

Jonathan Wilkins

Articles:

How geology affects the future of radioactive waste disposal

Geology is at the heart of a public consultation being conducted over the autumn. It forms an important part of the process to dispose safely of the country's radioactive waste.

The UK has been accumulating higher activity radioactive waste over the past 70 years, not just from power stations across the UK (including North Wales) but also from military applications and health facilities. Nuclear power stations have been a feature of energy supply in Great Britain since the 1950s when the first commercial power station – Calder Hall in Cumbria – began supplying electricity to the national grid.

Current surface storage facilities – there are more than 20 for higher activity waste (HAW) around the country – are actively managed: the environment is monitored and controlled at all times over its lifetime, which might be around 50 years or so. However, a permanent solution is required, one that does not rely on active mechanical systems to adjust and manage the conditions.

Within the UK, the Welsh, English and Northern Ireland governments have adopted a policy of geological disposal (as it is a devolved issue, Scotland is considering its own approach). The Welsh Government is currently consulting on the processes by which a geological disposal facility (GDF) might be sited in Wales.

Geological disposal is being adopted by countries around the world – including the USA, Sweden, France, Germany and Switzerland. It involves isolating radioactive waste deep inside a suitable volume of rock to ensure that no harmful quantities of radioactivity reach the surface environment.

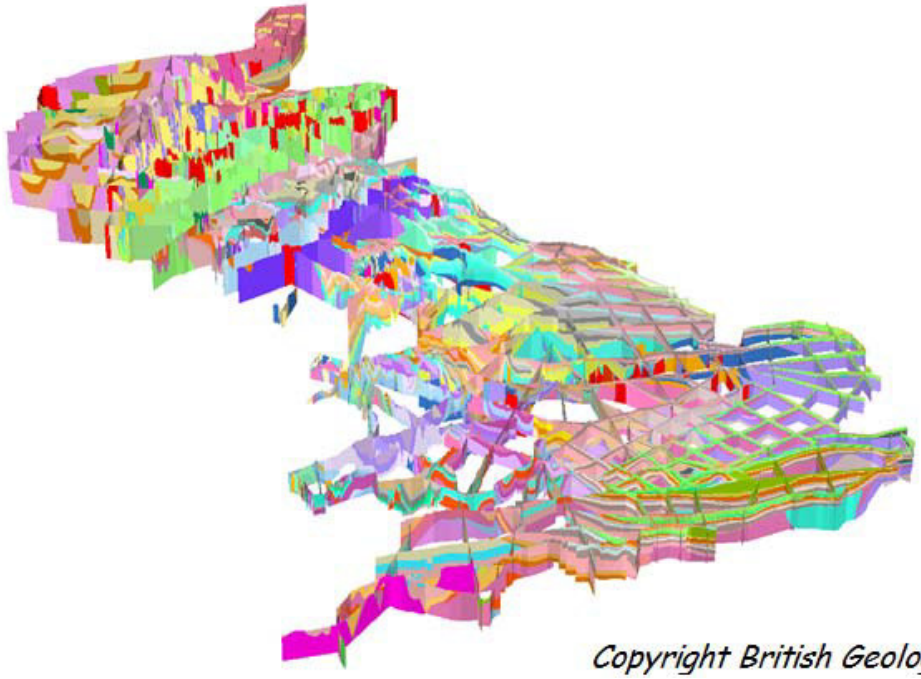
This is achieved through the use of multiple barriers that work together to isolate and contain the waste, providing protection over hundreds of thousands of years. These barriers include the package in which the waste is enclosed, buffers to protect the packages and prevent leakage, the engineering design of the facility itself and – pre-eminently – the geology within which the waste is placed. It is envisaged that any GDF would be located at a depth between 200m to 1000m below the surface.

Over time radioactive materials become less dangerous, although that period – measured by its half-life – varies substantially between inventories of waste. A small proportion of the current inventory has a half-life of many thousands of years. Before a GDF is built, RWM and its regulators will have to be convinced that any such facility would remain safe over these long periods of time. That body of evidence is contained in a series of 'safety cases'. The role of the environmental safety case is to demonstrate that the combination of multiple barriers can provide that long-term safety.

A geological disposal facility operating over hundreds of thousands of years will have to rely on passive containment. And here the geological environment plays an important role in isolating the waste

beyond the design life of the engineered barriers.

Before the siting process begins for a GDF, a number of initial actions will be completed. These were set out in a White Paper in 2014, Implementing Geological Disposal as preparatory work to inform discussions with communities wishing to learn more about hosting a GDF. Planning law needs to be revised to include the arrangements for developing a GDF as a nationally significant infrastructure project. As the site will require the active support of the local community, it is necessary to determine arrangements for engaging with those groups. And finally, a high level understanding of the geology and its relevance to developing a GDF safely will be required.



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The national geological screening (NGS) exercise is being carried out by Radioactive Waste Management (RWM), the Government-designated developer of a GDF. Working with the British Geological Survey (BGS), which holds much of the country's geological records, RWM will draw together the geological information that is relevant to the safety of a GDF. The aim is to present existing and high-level national geological information in an accessible way as an aid to help communities across the country decide whether they wish to engage in the siting process for a GDF.

So there will be two parts to the exercise: deciding what geological information is relevant to the safety case for developing a GDF (the guidance) and the presentation of that information in a useful and accessible format (the outputs). It is also important to note that geological information available at the depths of a GDF are limited, and therefore the screening exercise will also highlight what is not known. RWM's proposals will be the subject of public consultation in the autumn.

The guidance will be developed by focussing on a combination of geological attributes that affect the long-term environmental safety of a GDF. These have been divided into five areas or themes:

Rock type – three main rock types have been identified internationally as likely to

provide stable conditions for this type of facility and these are: higher strength rocks, lower strength sedimentary rocks and evaporites;

Rock structure – concerns the three-dimensional form and arrangement of different rock types, particularly the presence of geological features at depth, such as folding , faults and highly-fractured zones which will influence the uniformity and predictability of rock properties and groundwater flow;

Groundwater – the movement and chemical composition of groundwater present in pores and fractures in rocks from the surface down to a depth of around 1000m;

Natural processes – these include both progressive changes such as erosion, as well as individual major events such as earthquakes, that may affect the geological barrier over the timescales under consideration;

Resources – covers geological resources present or suspected at depth. It includes both deep-mined or intensely-drilled areas as well as the presence of potentially exploitable resources (coal, conventional and unconventional hydrocarbons, metal ores and industrial minerals). These are relevant to the potential for human intrusion into the area at some point in the future.

The guidance will be published after the consultation ends. It will then be used to produce the outputs. RWM will work with BGS to produce a series of narratives for 13 regions of the country, reflecting the areas covered in the BGS regional summaries. There will also be explanatory maps accompanying the narratives.

The NGS is not part of the siting process for a GDF. It is designed to bring together existing geological information, so that communities can make an initial decision about whether to begin discussions with RWM. It will not generate new information, which means there may be areas of the country where there is very little known. If communities do want to engage with RWM once the siting process starts, more detailed existing geological information will be compiled for their area.

The 12 week public consultation will take place over the autumn. In order to ensure that the final guidance reflects a fusion of the best advice and expertise, RWM is very keen to hear from everyone with an interest in this subject – including members of the North Wales Geology Association. This is an opportunity to get involved and provide input.

For more information, see RWM's website: **http://www.nda.gov.uk/rwm/national-geological-screening**.

And to keep up to date with developments on the NGS exercise and other aspects of the GDF process, sign up for RWM's e-bulletin at: **www.nda.gov.uk/rwm/subscribe**

Natalyn Ala,
Geological Disposal
Facility Siting Director
RWM

Editor's Note:

The consultation will go live in September with a closing date at the end of November. However there are two related consultations which are live as we go to print – the first with a closing date of 4th September:
https://www.gov.uk/government/consultations/implementing-geological-disposal-working-with-communities

There is a similar consultation being promoted by the Welsh Assembly Government – but with a somewhat earlier closing date of the 18th August:
http://gov.wales/consultations/environmentandcountryside/geological-disposal-of-higher-activity-radioactive-waste-community-engagement-and-implementation-processes/?status=open&lang=en

Update on the shifting sands of Cilborth Beach

Back in Issue 81 (February 2014) I drew attention to the dramatic loss of beach sand that had occurred following the storms of the few weeks previous, as seen at Cilborth Beach, Llangranog. Images showed the view of the beach looking northward in 2010 and 2014.

2010

2014

We can now compare the 2014 view with the appearance as at April 2015, as shown below. It is apparent that the sand has been entirely replenished in the year since the storms. It is an unfortunate turn of events for those wishing to see the trace fossil "*lagerstatte*" present in the rocks previously exposed, at the base of the flight of steps from the Coastal Footpath, but at least they are seemingly secure against the potential ravages of weather, tide and geological hammer – for the moment at least anyway.

2015

KHN

Symposium: Geology Of The Marches Ludlow October 2nd – 4th, 2015

We contacted many local societies in the second week of April, and feel it is now time to update you on the progress made towards our symposium "The Geology of the Marches, from Murchison to the Modern Era".

Ludlow is the venue for an event partnered by Shropshire Geological Society, Herefordshire and Worcestershire Earth Heritage Trust, the Woolhope Club and The Teme Valley Geological Society. The team is chaired by Dr Paul Olver.

The website (geo-symposium.eu) now contains all the details delegates need to make their choices of workshops and field trips. An online booking form is available, and payment is accepted by BACS and cheque.
Just to note that activities start on Friday 2nd for self-guided geology walks and guided visits / workshops at the Shropshire Museums Resource Centre. If you do arrive on Friday you may also register for the weekend at the Resource Centre.

John Nicklin
Secretary
Tel: 0774 9774432

A brief aside from Derbyshire

"A delineation of the strata of Derbyshire" by White Watson (1811) may seem a strange place to encounter a description of an unusual geological occurrence in Holywell, Flintshire; but nevertheless in that document, as a foot note to a discussion on the state of zinc mineralogy in Derbyshire, White states the following:

In sinking a shaft on a Lead Vein in Rellen Mine, near Holywell in Flintshire, in or about the year 1792, a Fir-tree was discovered at a considerable depth in an upright position, which from the cones found thereon, appears to be a species of the Larch, the wood of which appears unchanged except in being strongly impregnated with imperceptible particles of Lead Ore, which on being lighted at a candle, by blowing upon it, Lead issues therefrom in minute globules; a piece of the wood was entirely surrounded and incrusted with the Sulphure of Lead in a manner similar to which the Sulphuret of Iron is frequently found attached to sticks in the Clifts of the Island of Sheppy in Kent."

One mention of North Wales of course could be taken as mere chance. With two of course perhaps there is something of a coincidence to it? Not Watson's words directly, but an attribution to him by Trevor Ford, who wrote an introduction to the 1973 reprint as follows:

"He commented on a specimen of '*schist with the imperfect impression of a shell, apparently an areite, from the top of Snowdon, from which one would lay that Snowdown is not composed of primitive rocks*' (dated c.1820)."

If two mentions of North Wales in a book about Derbyshire are a coincidence then what does that make the third? Links between the Derbyshire and Flintshire mining fraternities have been known for many years, with typical Derbyshire names (such as Bagshaw) relatively common in the Deeside urban districts. Watson shows how long this relationship has been in place, and confirms that it wasn't a one way process:

"The most ancient method of obtaining Lead from its Ores recorded in this County appears to have been by fires made upon blocks of Sandstone, termed Boles, which were improved upon by the Blast Furnace, and in 1698, the Cupola was introduced from Holywell in North Wales; soon after which period Blast Furnaces went out of use…."

KHN

Reference:

Watson, W., (1811) "*A delineation of the Strata of Derbyshire, Sheffield*", (reprinted Moorland Reprints, Buxton, 1973).

Abstract:

Dr Lucy Muir – As Old as the Hills, Builth Wells

"The geological history of South China"

South China has had a complex and fascinating geological history. During the early Palaeozoic, the region formed a separate continental block in the southern tropics near the margin of Gondwana, with a sedimentary sequence from shallow-water carbonate platform to deeper-water basin. The region is of great interest to palaeontologists and geologists because it contains a number of Konservat-Lagerstätten, such as the famous Chengjiang Biota, and several global stratotypes.

Lucy Muir lived and worked in China for two years, and carried out fieldwork in several areas of South China, including at the Hetang and Kaili biotas. She will be talking about the history of South China during the early Palaeozoic, including its palaeogeographical position, stratigraphic sequence, and fossil biotas.

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Reports:

North Wales Geology Association

Wednesday 29th April 2015

Dr Alastair Welbon – VNG Norge

Evening Lecture: "*Characterizing and producing from reservoirs in landslides: challenges and opportunities*"

This was a joint meeting held in conjunction with GeoScience Wales at the Royal Cambrian Academy, Conwy. On a personal level it was a pleasure to finally bring Alastair (a university housemate) to North Wales from his home in Oslo to talk about his work in pulling together engineering geologists and petroleum specialists. This multidisciplinary work allows the intuitive understanding of landslide and mass movement mechanisms held by (some) engineering geologists to inform the siting of production wells, and explain variations in well production arising from past landslide activity.

Alastair gave detailed explanation of a number of North Sea fields, and their production history including a description of how mapping geomorphological elements can be used to estimate the likely range of net to gross production, and porosity of a hydrocarbon accumulation.

Since there are frequent lateral changes in properties in landslides (ask any engineering geologist – perhaps not their geotechnical engineering colleagues), their flow behaviour may not reflect the rock encountered in the well, but nearby material which is significantly different. Small, sub-seismic scale landslide features are important both in understanding reservoirs but also carrier beds and source rocks.

Geomorphological principles are also used in understanding shallow hazards such as sea-floor instability, layer bound and detachment slip systems, the distribution of shallow gas in reworked sediments and structures likely to reactivate during stress-arching during field depletion.

Perhaps the most memorable comment made was Alastair's description of how it was necessary at one point of a particular field's development to assess the risk of triggering a submarine landslide, and possible subsequent tsunami, which conceivably could impact the Western seaboard of the United States. The recent geological record shows that there is evidence that the largest natural events can be destructive, and affect many parts of the North Atlantic Basin.

A lively an interesting discussion followed Alastair's talk which was handled with aplomb, before Jonathan Wilkins offered the Vote of Thanks on behalf of both bodies.

KHN

Sunday June 2015

Field Visit: *"Llyn Ogwen and Llynau Mymbyr – The Chairman's Event"*

Leader: J Wilkins

Just enough spaces were left, by all of the various climbers / walkers meeting by the side of Llyn Ogwen, for the several, equally intrepid? members of the NWGA to also park their cars, for this; the penultimate Field Trip of the year.

Having answered Jonathan's request for our 'intentions to attend', our appetites had then been whetted by the reception of a comprehensive e-mail detailing the morning's anticipated activities and after fairly enthusiastically tackling a short, if quite steep, climb from the car park we were halted at the start of some prominent sandstone outcrops.

Here our attention was drawn to several features;

1) these were "roche moutonée".

2) the smooth surfaces showed several prominent striae due to the action of the ice.

3) the torn off back ends showing the direction of the ice movement - towards the west.

4) the occasional cross bedding suggested deposition in a possible shallow estuarine environment.

5) the dip of the strata showed the syncline we were expecting to see, and

6) the relatively coarse texture of the exposed surface was indicative of a sandstone laid down from the west during the late Ordovician.

The group then traversed some rather damp open ground (and a small stream), where a younger, softer, sediment has suffered and quite obviously still is suffering, from erosion. Finally we were brought to a halt at an outcrop of volcanic tuff/ash.

Our attention was then drawn to the appreciably less coarse texture of this rock. Some time was then spent by the group looking, with varying degrees of success, for clasts etc. The quite prominent flow banding was noticed, while the random presence of collections of small rounded nodules in this outcrop prompted so much discussion that the writer mentioned a time (while he was self-employed,) when he had mixed some cement in a mixer but, having failed to add quite enough water, had produced a very similar result from the

otherwise correct proportions of sand and cement.

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The presence of the several quartz veins was explained as being due to the quartz coming out of solution, and being deposited in the various weaknesses in the rock that the high pressure very hot water could find/form as it escaped from deep underground, cooling/boiling off? as it approached the surface.

We then walked across to view further outcrops, discussing as we went the relative sequence of the events in this part of North Wales. A picnic lunch was then taken after which we returned to the cars and made or way to the second location. Having spent the morning looking at the Llyn Ogwen syncline we then, went round (via Capel Curig) traversing the associated anticline, to have a look at another anticline on the southern side of the Llynau Mymbyr valley.

Here we saw a quite remarkable sight:

This glacial valley, which originally would have just had one long (ish) lake now had two due to the gradual silting up, not only from alluvial fans which had cut the lake in two, but also from the western end where the river entered the lake. Several Drumlins were pointed out. The Farm, on whose land we had parked, was situated on top of one of these and due to the richness of the soil beneath was called Garden Farm (Gardd yn syml yn Cymraeg wrth gwrs!) The southern / south eastern side of the valley before us was dominated practically from floor to sky by enormous slabs of exposed mudstone.

Crossing to the far (south eastern) side of the valley we then traversed a severely boulder strewn slope, with the exposure of these enormous sequential slabs of Ordovician mudstone on our left and all at an appreciable angle of dip (of which the writer has no record, but shown as 80° to the north-west on the map) revealing the uplift to the anticline. (Unfortunately the writer, having spent long periods during his Army career in Norway during the winter (very cold) months, rather than serving anywhere hot, found the heat of the afternoon to be somewhat trying.

It was with difficulty therefore that I finally appreciated that the glacial valley to his right was merely an eroded out, much younger, layer of the limb of the anticline on which we were walking.) There was much cleavage of these mudstone slabs and pieces that had already broken off, in size ranging from footballs to buses, littered the ground all around, requiring careful attention to where we placed our feet as we progressed. Then, just as it was starting to get a bit tiring... *'Around the next corner...*' urged Jonathan.

Copyright L Relph

And oh, was our endurance rewarded! What a fantastic sight met our eyes! We could now see the top surface of the youngest of these enormous slabs. Glacial ice had smoothed the top of course, but the

very last episode had also torn off parts of this top layer to reveal, immediately beneath;- a large bed of very sizeable Storm Wave ripples. While the rest of the group climbed away uphill to examine further this very extensive exposure the writer sat down, unpacked his flask and had a drink of his tea, full of wonder at the sight before him. Truly a memorable day! Thank you Jonathan.

PS. Being a bear of rather small brain the writer is full of admiration for those who can, not only absorb information on such occasions, but also take copious notes at the same time... Oh, if only they could be persuaded to write a better, more comprehensive debrief (and do justice to) field trips such as this; rather than this poor attempt at describing a very interesting, instructive and extremely rewarding day.

Frank Buxton

Sunday 5th July 2015

Field Visit: *"The Ordovician / Silurian Boundary near Llanymawddwy – a new look at an old problem"*

Leader: K Nicholls

I had been particularly looking forward to this field trip ever since the word 'Trilobite' had been mentioned. Ever since becoming interested in Geology (and Palaeontology in particular) at school and then latterly at College, I had never found a Trilobite. Numerous other fossil types but never a Trilobite…

Stop one was at the top of the very scenic Bwlch–y-Groes, one of the highest public road passes in Wales, and the first exposure was immediately across the road to investigate the relationship of the dip and cleavage in the Moelfryn Mudstones. This relationship was then further examined at other localities in the vicinity, together with observation of the ongoing erosion of upland peat. The effect of the geology on the glacially eroded Afon Dyfi was also considered, with the southeast side of the valley exposing Silurian rocks while the northwestern side exposes Ordovician rocks. This magnificent valley and its steep, scree strewn valley walls were further observed as we descended down the valley to the afternoon stop at Llanymawddwy.

It was about this time that the forecast wet weather rolled in, so lunch was taken in the cars during the worst of it before venturing into Cwm Pumryd and the ascent of the valley floor to the first locality, where a dip/scarp topography reflecting variation in strength/consistency of different horizons within the Foel y Ddinas Mudstone is revealed. The weathering of the scarp has produced a substantial scree slope, and it is here that Philip Magor (ex-Cambridge University) recovered a specimen of a "Cruzianid" trace fossil. KHN has also recently recovered what appears to be an external mould of a similar trace fossil from the same scree slope, and I was fortunate enough to find a third example myself (see photo).

Unfortunately, continued searching revealed no further examples.

Next we continued further into the Cwm, towards the waterfall at the base of Pistyll Gwyn, effectively walking down section

into successively older rocks. The mapping suggested that we should reach the graptolitic Nod Glas horizon (Katian – late Caradoc) at the base of the waterfall and that the underlying Gelli-grin Calcareous Ashes, Cymerig Limestone and Nod Glas would offer opportunities to collect a wide range of fossils. And so it turned out to be.

Examination of the numerous scree slopes soon began to reveal fossils. Brachiopods were a common occurrence as people busied themselves among the rocks. Soon reports of trilobites were spreading, or at least fragments there off, with pygidium and cephalon noted (including fragments of the distinctive Ordovician *Trinucleus* with its rows of pits around the cephalon). It was while examining a pygidium (incidentally my first ever definitive trilobite find) that I spotted there, by my foot, a small but almost complete trilobite. My first ever proper trilobite find (see photos below).

Later observation under the hand lens showed a small part of the cephalon to be missing on one side but the other side still retained a well preserved eye ridge complete with perforations representing some of the lenses. The segments of the lobes on the thorax were also very distinctive and well preserved. I believe my trilobite to be an example of *Klouceicia apiculate* (M'Coy, 1851) which has previously been reported from the Gelli Grin strata. However, our esteemed chairperson thinks I should call her 'Tracey'! Other finds included a couple of ostracods spotted by eagle eyed Richard Birch (see photos below), which I believe includes the species *Brephocharieis complicata* (Salter, 1848) Siveter, 1985 (originally called *Beyrichia complicate* Salter, 1848).

Gary Eisenhauer

Post field trip discussion

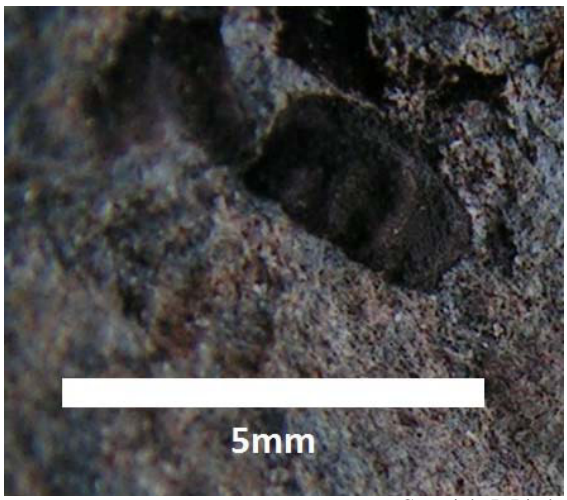
Birch > Eisenhauer
The most abundant trilobite genera throughout the Ordovician in Wales are the Calymenid trilobites, whose nomenclature appears to be a bit of a mess. Initially the specimen above looked like *Gravicalymene* cf. *arcuata* – the only name one can be certain of - but on closer inspection it appears to be something different. I attach an image of the trilobite *Liocnemis* – a Phacopid trilobite from the late Ashgill of the Crugan mudstones on Lleyn.

Copyright R Birch

This is a fairly rare species (I have only the one complete specimen). It differs in

having a flat pygidium with a marginal border: Calymenids have cone-shaped, inflated pygidia. Note also the 'eye-spots', which are not eyes but inflated glabellar ridges. These appear to be present on your specimen too. It also looks like there's a terminal spine on the pygidium. You'll need to excavate it to aid identification, and its worth consulting with Keith for the faunal list for that site as a prompt.

I also attach some images of the ostracods.



Copyright R Birch

Copyright R Birch

They resemble the ostracod *Beyrichia*. However, *Beyrichia* is a Silurian group, so it won't be possible to be certain of the identification.

Nicholls > Eisenhauer
The faunal listing Richard refers to above is that published in Bassett et al, (1966) and for the Gelli-grin Calcareous Ashes gives the following (diverse) trilobite assemblage:

Amphilichus sp.
Broeggerolithus nicholsoni
Brongniartella minor
Chasmops cambrensis
Conolichas melmerbiensis
Cybella dentata
Deacybele pauca
Estoniops alifrons
Flexicalymene planimarginata
Isotelus sp.
Platylichus nodulosus
Primapsis cf. semievoluta
Protidella sp.

The contrast with the overlying Foel y Ddinas Mudstone in which we rooted around in the lower (eastern) part of the valley is striking. In this lithology Bassett et al list an "assemblage" of only one species, *Dalmanitina (Murcronapsis) mucronata*. This indicates the local effects of the globally recognised Hirnantian Extinction episode.

Reference:

Bassett DA, Whittington HB and Williams A, "*The Stratigraphy of the Bala District, Merionethshire*", QJGSoL, **Vol 122**, pp219-271.

Eisenhauer > Birch / Nicholls

Not sure you are aware, but I found the following website at Birmingham University. It appears to be an Online Collection with numerous trilobite images. Just use the search at the top and select 'any word', can use names, locations, ages etc. Anyhow, follow this link:

http://mimsy.bham.ac.uk/info.php?v=2&s=gelli&type=any&t=objects&f=&d=&page=6

I think my specimen could possibly be *Klouceicia apiculata* based on rib pattern on thorax? Not so sure about the cephalon but the preservation is not so good on mine!

I think the ostracod is *Tallinella complicata*.

Geological Society of London, North West Regional Group

Thursday 16th April 2015

Andrew Moore – WSP Group

"Understanding Historical Lead Mining at Halkyn Mountain"

In managing to put on a talk on a "hot" local subject, and putting it on at the excellent Main Campus Site at the University of Chester, the GSoL pulled off something of a coup with this talk. As a result this was an exceptionally well attended talk, with about 60-70 attendees nearly filling the Beswick Lecture Theatre.

This talk detailed the work WSP had undertaken on behalf of the Grosvenor Estate in mitigating the land / mineral owners risks associated with the extensive historical legacy of lead zinc workings in and around Halkyn. The work comprised a comprehensive desk study to ascertain the location of the key mineral veins. This information has then been used to populate a GIS package with population centres, elements of infrastructure etc. This has allowed formal risk assessment to be undertaken, and has led to the establishment of a rational structured approach, rather than simple reactive response, to liability management by the land owner.

There were some surprises in the talk – and a fairly lengthy discussion period followed– with questions being asked as to the breadth of the desk study research, the risks associated with potential stope collapse (with recent work having been limited to dealing with mine entries), and the question of liability given that the land owner has treated some sites, but left others, albeit those deemed not so critical, in their as found condition.

KHN

Britain and Ireland Graptolite Group

2015

"*Annual Meeting"*

Llandrindod Wells

This was a small (but perfectly formed?) meeting of no less than 5 individuals, comprising Mike Howe (British Geological Survey) James Wilkinson (University of Leicester), Lucy Muir (our forthcoming speaker – 9th September), Joe Botting (our recent speaker) and your very own correspondent.

Mike Howe (BGS) gave a presentation on the remarkable 3 D photography work being pursued by the BGS on an open access arrangement – making the very best of the digital media available to all (see GB-3D web site for details.

http://www.3d-fossils.ac.uk/

Joe Botting described his recent work at Afon Gam near Arenig, in collecting exceptionally preserved biota (further to his recent talk to the NWGA).

I updated the group on the recent graptolite death assemblage find at Llyn Geirionydd.

Following the talks the group visited the Radnorshire Museum and viewed the excellent geological display that Joe

Botting and Lucy Muir have had significant input in establishing. The museum is something of a one off – despite its small size the display is of the highest quality – nothing is dumbed down, but everything is accessible, to school child and specialist alike. Anyone passing through Llandrindod should make the effort to visit the display.

The geological display at Llandrindod Museum

Opening times are typically 10AM to 4PM Tuesday through Saturday, although visitors should check in advance of any visit:

Contact Details follow:
e-mail: radmus@powys.gov.uk
Web Site:
www.powys.gov.uk/radnorshiremuseum
Telephone: 01597 824513

As if three talks and a museum visit were not enough, the group then visited Llanfawr Quarry; only a short walk from the centre of Llandrindod; and collected a wide range of fossils including trilobites, and graptolites, (see below) as well as rather more infrequent sponges and orthocones.

***Dicellograptus cambriensis* (and friend). Alignment of both specimens suggests some form of gentle current during sedimentation**

Dicellograptus cambriensis

Trilobite *Ogygiocarella angustissima*

All in all, this was a full and fascinating day's geology, and once again made clear that we have a remarkable geological smorgasbord on our very doorstep.

KHN

Publications Related to North Wales:

Bevins, Richard E.; Nicol, Douglas; Solera, Sergio A., (eds.) (2015) *Urban geology in Wales. 4*. Cardiff, UK, National Museum of Wales, 227-233. (National Museums of Wales, Geological Series, 27).

Boon, D.; Kirkham, M.; Scheib, A.. (2014) *Physical properties of till deposits from Anglesey, north west Wales*. Nottingham, UK, British Geological Survey, 68pp. (OR/14/052)

Muir, L. and Botting, J. (2015) *An outline of the distribution and diversity of Porifera in the Ordovician Builth Inlier (Wales, UK)*, Palaeoworld 24 (2015) 176–190.

Dates for Your Diary:

NWGA: 2015 Programme

NWGA Meetings

Wednesday 9th September, 2015
Dr Lucy Muir – As Old as the Hills

"The geological history of South China"
Pensychnant, Conwy, 7:00PM for 7:30PM start

See Abstract elsewhere in this Newsletter

The Palaeontological Association

14-17th December, 2015

"59th Palaeontological Association Annual Meeting"
Cardiff University and Amgueddfa Cymru – National Museum of Wales
Further details on the Association Website at:
http://www.palass.org/index.php

Shropshire Geological Society (and others)

October 2nd, 3rd and 4th, 2015
The Geology of the Marches, Murchison to the Modern Era
Further information, links to trail guides, booking forms, full programme and charges:
www.geo-symposium.eu
Further information given in the Newsletter article herein

British Geotechnical Association

September 13th – 17th 2015
XVI ECSMGE, Edinburgh "Geotechnical Engineering for Infrastructure and Development" – Conference web site at:
http://xvi-ecsmge-2015.org.uk/

BIGG / Ludlow Research Group

September 26th and 27th, 2015
"Field Trip and Business Meeting - Ludlow"
For more details register on the Ludlow Research Group Jiscmail site at:
https://www.jiscmail.ac.uk/cgi-bin/webadmin?A0=LRG

Oreil y Parc Gallery, St Davids,

Daily until 25th November, 2015
"Alfred Russell Wallace – The forgotten evolutionist"
National Museum Wales Gallery, Oriel y Parc, St Davids, Pembrokeshire.
Gallery opens 10AM to 4PM
www.orielyparc.co.uk

Web Site and Social Media:

Up to date information on our activities is posted regularly on the Association web site at:
http://www.ampyx.org.uk/

A much more informal way of keeping in touch with an eclectic mix of NWGA events, and other geological News items is available on the NWGA Facebook page at:
https://www.facebook.com/groups/northwalesga/

Committee Contacts:

Chair and Website:
Jonathan Wilkins
Tel: 01492 583052
wilkins@ampyx.org.uk

Meetings Secretary:
Gary Eisenhauer
Tel: TBC
g.eisenhauer@btinternet.com;

Secretary:
Judith Jenkins
judith.sunfield@yahoo.co.uk

Treasurer:
Cathy O'Brien
cathy@obrien6236.freeserve.co.uk

Newsletter Editor:
Keith Nicholls
Tel: 01352 750925 or
07442 495534
keithhnicholls@gmail.com
or keith.nicholls@opusinternational.co.uk