Cymdeithas Daeareg Gogledd Cymru

North Wales Geology Association

NEWSLETTER

Issue 93 September 2016

Inside this issue:

Front Cover Image:

An absolutely spectacular wedge failure formed by sliding along two intersecting planes comprising bedding (on the left, and folded into the rear) and an orthogonal joint plane (on the right), Parys Mountain, Ynys Mon. The rocks involved are Silurian (Llandovery) shaly mudstones

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Chairman's Message

As I write this there is (perhaps because of the weather) a distinct feeling that the summer has passed and with that a natural focus on where the Association is going in the Autumn. Well - look inside to find out! Remarkably, ideas are still emerging for outdoor meetings, despite the fact that we have already organised more than is usual this year. We look forward to your participation in our forward programme and hope that it delivers what we have planned.

I know that there are articles in this newsletter reporting upon the field meetings held since June, but I would like to add my own impressions of what we have shared this year. It has always been my policy that field meetings are the most important that we organise, since we are fortunate to live in a scenically beautiful and geologically rich area, and sharing the knowledge that has accrued over decades or centuries of geological research is the cornerstone of our regional status.

In June we visited the northern part of Anglesey, on a rather wet day and looked at the Gwna Mélange and the igneous intrusions that cut across it. As ever, the interpretation of field relations, of the different rock types exposed and even what a stromatolite 'should' look like proved controversial, though with our limited investigatory powers no radical new hypothesis emerged. I was surprised to find that there are actually geologists in North Wales who have never visited Parys Mountain, so it was a fitting end to the day for some of them to overcome that handicap. Once again the question was raised as to how it can be possible for the general public to wander around a pit of such dimensions and manifest hazards? To which my response must be "don't ask or it will be closed-off".

July saw us "down-south" in the Dolgellau district, visiting Cader Idris in the company of Graham Hall once more - he is a most amiable and knowledgeable guide and we enjoyed a splendid day out in superlative weather. What we saw varied from slate quarries, magnificent glacial landscapes and intriguing igneous intrusion within the context of one of Wales' most iconic scenic districts. Only the extortionate car parking charges and pernickity ticket machine of the Snowdonia National Park threw a shadow over the proceedings. Thank you again, Graham, and I hope that we will be back on your patch in the near future.

August saw a meeting held in the renowned slate quarrying district of Nantlle, which I was sorry to miss, but the proximity of my annual holiday and the necessity of keeping a multi-generational family happy meant that I was forced to duck-out

at the last moment. I regret that because I have always been fascinated by the austerity of the historically-important quarrying sites, and really not well-enough informed on the geology of the sediments which are exposed. I think I must blame an early exposure to the writings of the Rev. W. Awdry and his evocation of Welsh slate railways (based so clearly and accurately on the Talyllyn Railway) which were almost undocumented at the time he wrote of them. The illustrations in the books of structures created from the quarry waste in the form of walls, viaducts and inclines are accurate and evocative and probably added a thirst for industrial archaeology to my enthusiasm for rocks and mountains (and narrow-gauge railway locomotives).

Our family holiday on Kintyre was a success, though I have to admit that endless Dalradian schists can pall after a while, even when they are relieved by contemporary amphibolites, but the discovery that the entire landscape of the Knapdale district is shaped by the strike of those beds of schists was remarkable. Thin fingers of rock run out into the sea to form reefs and secluded inlets, while on a larger scale, resistant amphibolites form high land because in this area the metamorphic grade of the Dalradian is not high and the schists are weak. I spent a day on Arran just poking about in the Lochranza district on my bicycle and that restored my jaded appetite - even though I stood at and missed completely Hutton's Unconformity at Newton Point. In truth, the geology is straightforward and the conflicting dips of Dalradian and Devonian rocks are easily appreciated, but the point at which they come together is confused and far from obvious, which is a comment also made by a number of media presenters, not least Paul Murton in his series of Highland Grand Tours by BBC Scotland. On the other hand, Palaeogene dykes intruding Permian sandstones were spectacular, and the associated breccias were a delight, while looking down on it all are the lofty peaks of Goat Fell with extraordinary glaciated crags and valleys formed in the North Arran Granite Pluton. Fantastic and inspiring stuff!

The recent news of the devastating earthquake in Italy was a sad reminder of the power of processes that shape our planet, and that rhe thrust faults and strike-slip movements are not only the defining features of orogeny but bringers of destruction. It is difficult to comprehend the scale of the damage and social upheaval that the latest episode has brought to a country so close to our own, and our thoughts are with those who have suffered loss and bereavement.

While on the subject of bereavement I note that the Association has lost one of our most stalwart supporters over the summer. Keith has prepared

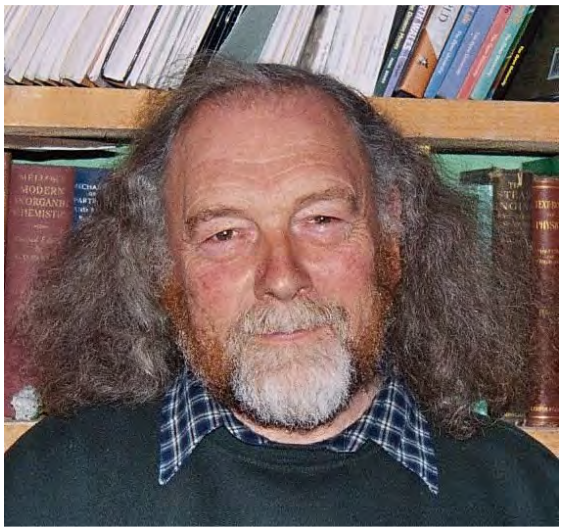
a short obituary for Frank Buxton and I am sure you will all share a moment with me, in remembering a moment or two with Frank.

Jonathan Wilkins

Articles:

Obituary:

Francis (Frank) Buxton 1947-2016



Francis ("Frank") Buxton died peacefully at home in Connah's Quay on June 2nd 2016.

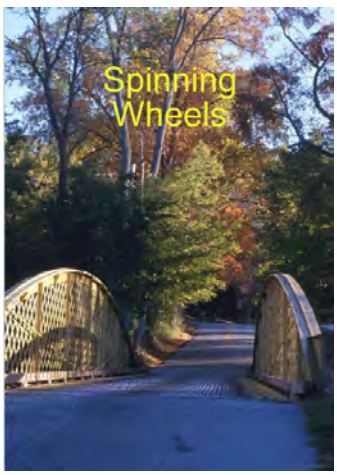
I first got to know Frank as a fellow student on the "Popeth Cymraeg" Welsh Beginners and Intermediate Course held in Mold when I returned from overseas in 2000. We regularly chatted over a coffee during breaks, and occasionally had a convivial group social before we both gave it up as a bad job, after about two years.

I was delighted however to come across Frank again a few years later on joining the NWGA. Frank was our Treasurer at the time, a position he took seriously, and worked at diligently. I was very pleased that I would have some company on the car journeys along the A55 to our evening meetings in Conwy, and on our field visits all over the place.

Over some eight or so years then I shared many journeys from Flint or Mold to

destinations all over Wales. Most would end up in Pensychnant, but of course some would be much further afield to the Lleyn, Ynys Mon, Snowdonia and even Cardiff (pictured below, in the racks, beneath the National Museum of Wales).

As the Association's Newsletter Editor I was always confident that Frank would provide a thoughtful short article on a field trip if asked. I know Frank was always a little reticent, fearing that his U3A interest might not be "up to scratch" – but I never worried – his pieces were always well written and interesting – as befits a published author (Spinning Wheels) of course.



My knowledge of Frank pre-NWGA is a little piecemeal, picked up in dribs and drabs over many conversations about somethings and nothings while tootling along some or other Welsh A road. Consequently some of what I write below may not be entirely accurate, but is offered to the best of my belief.

Frank was brought up in the Fenlands of Eastern England. I seem to recall some conversations about a Catholic Boarding School upbringing which only served to turn Frank away from established religion. Frank spent a number of years in the army (Royal Electrical and Mechanical Engineers, attached to the Commando units) – and I believe served in Norway, Germany and Northern Ireland. In later years he taught Electrical Engineering as a civilian staff member to Apprentices at RAF / DARA Sealand before retiring. Retirement cannot have rested easy with Frank however, because I know he considered returning to work as a Teacher, before enrolling on his OU degree course which he successfully completed in 2015. Frank also apparently spent some time at Findhorn https://www.findhorn.org/ in Scotland.

With only an incomplete background to write about perhaps it is best if I just list the things that I know Frank cared about deeply, and allow readers to make their judgement of the man from that list:

- His four daughters, Lucy, Jenny, Katy and Emily - his long estrangement from them was very hard on him
- The natural world - geology, flowers, birds and in particular dragonflies
- The mechanical world – Frank loved steam engines – both full size and model

- Other people – Frank's view of Utopia would have been some sort of Socialist Society where everyone could study for as long as they wanted, and no-one was tempted to take advantage of anyone else's misfortune.

Frank's health had begun to suffer in recent years with high blood pressure and problems with his eyesight begining to manifest themselves, and I certainly got the feeling from Frank in recent years that he was beginning to tire, if not of life itself, then of its' trials and tribulations. Rest in Peace Frank, you are will be much missed.

Keith Nicholls

Gwynedd RIGS Group

Members of the North Wales GA will hopefully be interested in developments in the RIGS organisation in Wales, and in particular in Gwynedd.

Regionally Important Geological Sites (RIGS) are non-statutory designated sites intended to support Planning Authorities and protect sites of importance from detrimental development. Sites are designated by RIGS groups which function in an advisory capacity and designate sites in consultation with the relevant planning authority.

Up until very recently such RIGS work in our area has been carried out by two RIGS groups, one based in Flintshire, Denbighshire and Eastern Conwy (NEWRIGS), and one based in Ynys Mon, Gwynedd, and Western Conwy (Gwynedd & Mon). It has become apparent however to a number of people with interests in Gwynedd, that the G&M Group has, in recent years at least, focussed its activity primarily in the GeoMon Geopark. It has now been agreed that responsibility for designating RIGS sites in Anglesey will now pass formally to the GeoPark organisation, and that a new RIGS group will be established with the intention of working in Snowdonia and Lleyn.

Figure 1 below is a plot of the coordinates of the existing RIGS sites in the North West Wales region, from which the relatively low density of RIGS sites within the Snowdonia National Park and the Lleyn Peninsula in comparison with Anglesey can be seen immediately.

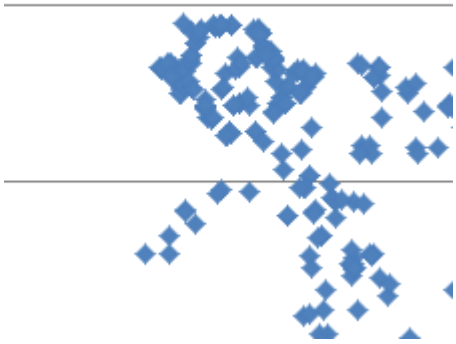


Figure 1 – Density Plot of existing RIGS sites in North West Wales.

Membership of the RIGS Group is open to all, and it is very much hoped that the NWGA will play an active if informal role in bringing forward potential sites in the future. Whilst site designation does require some formal writing up – it is hoped that the need for group meetings etc will be limited, so that formal group meetings will be on site visits, and that a small "executive" will take care of most of the formalities.

Anyone wishing to get involved please contact Keith Nicholls.

KHN

What's this then?

I wonder if anyone in your group can help me? My sister-in-law lives in North Wales and took some photographs of 'fossils' in some rocks near where she lives and sent them to me because of my interest in such things. The nearest town is Blaenau Ffestiniog and the objects are roughly 5 to 6 inches across. I believe that would place them in the Llanvirn deposits but I have been unable to find any similar objects on line. I find it difficult to decide whether they are biological or geological in origin without having seen them in real life myself.

If anyone can shed any light on them I would be very grateful.

Many thanks

Guy Moody

The unusual occurrence of yellow clay in Llanystumdwy

The Association has been approached by a landowner wondering whether we might be interested in an unusual occurrence of yellow clay on his land near Llanystumdwy, Gwynedd.

Apparently the typical ground conditions are a very ordinary boulder clay but at one specific location it changes to a very soft creamy yellow clay.

If anyone is passing by and would be interested in having a look please contact me and I will put you in touch with Mr Clarkson at Tyddyn Cwchallt. The Post Code is LL52 0NA.

It occurs to me that this might be the surface expression of one of the Tertiary Clay infilled pipes that occur sporadically across North Wales. The BGS Geology Viewer suggest that the bedrock is Ordovician shales and volcanics (Caradoc) and that the drift is glacial diamict.

KHN

Abstracts:

Gold Rush: Prospecting and Small Scale Mining for Gold and Diamonds to the Present Day

Gold rushes have had a major impact on world history; from the settlement of California to the development of Australia, and modern rushes continue to shape parts of West Africa, Brazil, Indonesia and elsewhere. This talk follows the journey of British and Australian geologist Jim Richards who has been involved in various modern-day gold and diamond rushes around the world; prospecting, alluvial mining and exploring for minerals.

This includes time spent in Guyana in South America, mining bonanza grade gold and diamond deposits from the rivers on top of the tepui plateaus of the Pakaraima mountains; hunting for giant gold deposits in the jungles of Laos in South-east Asia; and finding high grade gold mines in the deserts of Western Australia.

Currently, Jim is the Executive Chairman of a publicly listed mineral exploration company based in Perth, Australia. His lead project is an alluvial diamond prospect in the remote Kimberley region of Western Australia which contains some of the world's finest yellow diamonds BlinaDiamonds. Jim's memoir Gold Rush is being published in the UK on 4 November 2016.

Jim Richards

"Assessing the hazard of low frequency, high magnitude landslide events; the role of the engineering geologist"

During a severe rainstorm on 7 June 2008, over 2,400 landslides were recorded on Lantau Island, the largest island in Hong Kong. Numerous road links were severed and many landslides impinged on existing residential developments. This was one of the most notable storms to have occurred in Hong Kong in several decades, with a 4-hour rolling rainfall equated to a return period of 500-1000 years. A number of the landslides developed into major debris flows, with significant secondary entrainment and long run out distances. Such hazards were underrepresented in the existing data sets at that time.

The presentation will outline the approach to landslide assessments in Hong Kong, discuss the hazard from debris flow with reference to the 2008 storm, illustrate the uncertainty associated with assessing debris flow hazard and examine how this uncertainty can be reduced.

Whilst there are limited historical records of debris flows in the UK, they have been documented in North Wales, the Lake District and Scotland, with the impact on the A83 Rest and be Thankful being most notable. There is also evidence that the frequency of such events is increasing and the lessons learnt in Hong Kong are useful for the evaluation low frequency, high magnitude debris flows in the UK.

Steve Parry

Book Review:

"The Origin and Nature of Life on Earth"
Smith, E. & Morowitz H.J. 2016. Cambridge University Press. Hardback 677p.

This book is a tough read. It has the subtitle "The Emergence of the Fourth Geosphere" – the other three being the three old Greek Elements Air, Earth, and Water, or in modern parlance the Atmosphere, the Lithosphere and the Hydrosphere. Current thinking has replaced "Fire" with "Life" of course.

I have to say that this was not the book I was expecting when I ordered it blind from the web. I thought I would be getting lots of pictures of ancient cells, of the Precambrian precursors to multicellular life – some algae, lots of archaea perhaps. Maybe some biomarkers, some proxy data (banded ironstones etc).

In truth this is a book not about nature, but about chemistry. The lesson that I took from this book is that life is not about the organism, it is about metabolism. Metabolism is a functional necessity that comes out of the need to process chemistry in a world governed by plate tectonics. In a very real sense we seem to be back to the fourth element of fire – with life inextricably bound, at least in its origins to the wet chemistry of volcanoes.

This is not an enjoyable read if like me you have to go running for an A Level text book to remind yourself what stoichiometry means. Getting my head around sentences like:

"The reactive functional groups of rTCA are not as permissive of open-ended complexity, but if they can be formed, they do still open networks of possibility that risk becoming chaotic."

"The metabolic substrate shows many invariant patterns in small-molecule chemistry against a background of change in enzymes, cofactors, or higher level cellular systems."

was something of a struggle.

That is of course my problem for not being much of a chemist, not the authors'. This book is superbly produced, and seemingly perfectly edited (I have looked in vain for typos). It is full of chemical process diagrams which no doubt chemists will find fascinating. The only production related quibble I have is the lack of good quality photographs of black (and new to me white) smokers and other "features geological".

There is a lot of philosophical cross over between chemistry and information science, between chemistry and molecular biology. For me however the cross over between chemistry and geology was not as fully developed as I would have hoped to see.

This is a book for the specialist – don't think it's suitable as the next birthday present for someone with a passing interest in Precambrian biology. If however you know a geochemist wishing to cross over into the world of molecular biology it's the ideal gift (and very good value at £29.99 for the hardback).

KHN

Reports:

NWGA Summer Meetings

"Llanbadrig"

This field visit, led by Phillip Firth following on from his lecture to us some months previously, was absolutely fascinating. Unfortunately the best weather Mon, Mam Cymru could offer us was a damp haar, occasionally rising to the standard of a full Best of British summer drizzle.

After a brief review of Phillip's Masters research we made the short walk from Llanbadrig Church to the cliff top a few hundred metres away. Here we viewed the supposed unconformity between the Gwna Melange and the overlying Ordovician sediments in cliffs to the east. It may have been a consequence of the light on the day, but this was not a spectacular sight (Figure 1 below).

Figure 1. It's in there somewhere

We also saw the first of four Palaeogene? dykes that Phillip has been studying. Unfortunately at this location the wet underfoot conditions meant we couldn't venture down the cliff to see these up close and personal. Close by we were able to see the large limestone olistostromes (sedimentary geology speak for mega - clasts) that have been so important in establishing the importance of the Gwna

Melange in recent years. The limestones are, of course, biogenic in origin, and we were lucky enough to spot two substantial stromatolites (Figures 2 and 3 below).

Figure 2: Domed stromatolite. The hammer is lying on a horizontal surface which cuts a section through the domed stromatolite structure.

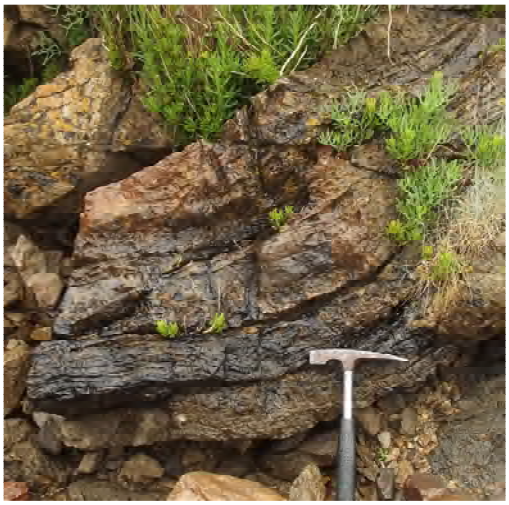


Figure 3: Laminated (inverted) domed stromatolite. One of the top surfaces at bottom left shows a rippled biofilm surface.

With access to the cliff bottom curtailed by the weather we finished the Llanbadrig coastal section by lunch time, and the group then headed off to see the nearby Parys Mountain Open Cast Copper Mine. There is too much to be seen there to be described adequately in this short space. So perhaps that should be left for an article in a Newsletter in the near future (any potential authors please make yourselves known).

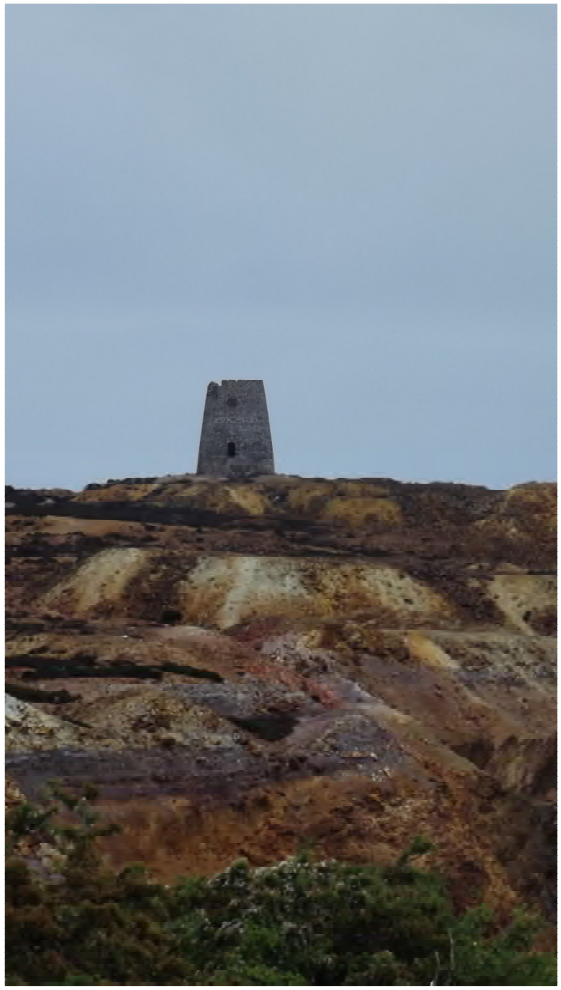


Figure 4: Parys Mountain

This wasn't the best day's weather you would hope for in early June, but these rocks are fascinating, and our membership always means good company, so all in all an excellent day out.

KHN

"Cadair Idris"

Having spent two days at Porth y Post, Anglesey investigating the folded chlorite mica schist and the Tertiary dykes for our A level coursework, we joined a group of ten to investigate the Ordovician rocks on the north face of Cadair Idris being led by Graham Hall. When we arrived at the car park the first person we saw was our geology teacher, Ray Humphreys, from the Alun School Mold, we couldn't tell who was most surprised.

Our first stop was the disused Crown Slate Quarry which has first records of William Roberts Williams being the quarry engineer in 1868. At its' peak in 1882 the quarry had employed 47 men and mined 250 tons of good slate, the named agent at this time was William Ellis. Work was suspended in 1899 after being given to Long Acre Birmingham and transferred back to Crown Slate Quarry in 1897.

The slate was made of a very low grade regional metamorphism of dark grey and black mudstones. Only 10 percent of what was mined was actually useful due to the slate being oxidised. Another reason why the proportion of slate used was so low was due to there being two cleavages. The main cleavage was near horizontal and the pillaring cleavage was then vertical, making the slate unusable. These cleavages appear to change orientation throughout Dolgellau: the main cleave is trending north-south in the south and turns north east-south west in the north whereas the pillaring cleavage curves around the upper limit of Ordovician volcanics to the north of Dolgellau.

The metamorphism at Post-y-Porth was a much higher grade than at Cadair Idris. At Post-y-Porth the chlorite mica schist had a huge range of folds. Some were tight, recumbent, thick and thin. At Cadair Idris some of the bedding planes of the slate were still visible!

On the field trip the ten of us walked up the Fox's path, the most direct route to the summit although we didn't make it that far. We stopped at the impressive Cwm Gadair, a kettle lake carved out by an ice glacier many years before! The ridge of the Cwm was dark green in colour (mafic composition) with concordant dolerite sills up to 200 meters thick. What was unusual was that there was a light pink coloured scree leading steeply up to the dolerite sills. The light pink colour showed the scree was microgranite, previously known as 'granophyre'. A very beautiful scene with a lot of interesting history! We found it hard to understand how the two completely different materials came so close into contact, but Graham explained that they occurred at the same time.

At Post-y-Porth the only igneous rocks we studied were dolerite dykes, so it was easier to study and grasp what had happened and when, whereas at Cadair Idris it was unfamiliar to see the two extremities of composition so close together, making it much harder to come to a conclusion. We will study magmatic differentiation when we go back to school in September as part of GL4 paper.

All along the path there were huge boulders of pyroclastic ash which shows Cadair Idris had volcanic activity, which ceased in the Caradoc times. The boulders were unusual because they had bedding planes present, which raised the question if they were igneous or sedimentary rocks. Mr Humphreys reassured us that they were still igneous but had gone through a sedimentary process. The bedding planes were formed by the ash being laid down, layer by layer, and compressed into a solid boulder. In one rock there was a clast in the centre of a bed, causing the layers to bend around the clast, we'd never seen anything like it! Once again there was the two extreme compositions, rhyolitic and basic with no intermediate, which raises

questions about how the two materials came from the same volcanic area.

To continue our trip to the summit of Cadair Idris we passed along a path with barbed wire fence one side and on the other side head high bracken which obstructed our path. Once we had cleared the bracken the next challenge was to negotiate the barbed wire fence which blocked our path. After that we then advanced towards a dry stone wall which was duly scaled and continued onwards and upwards to the ridge. As we ascended up the valley created by a glacier in the last Ice Age we saw striations left behind by rocks being scratched by the overlying ice being moved across it.

Basaltic and rhyolitic rocks can both be found. The rhyolitic rock are formed subaerially from quartz rich viscous magmas, whereas the basaltic rock as they were formed by basic magmas. The question was how can one magma generate different types of rocks? The rhyolite appear white when weathered but quite glassy in texture. Ash is laid down and compressed while hot and welds together forming rhyolitic tuff as they are deposited from pyroclastic flows. The dolerite sill at Mynydd y Gader is fine grained compared to the size of the intrusion, so how can a large magmatic body cooled so quickly

Graham our guide suggested that what is taught in school regarding crystal size is incorrect. He said that crystal size is related to the amount of water in the magma. Wet magmas generate large crystals, dry magmas finer crystals. Chilled zones on the edge of intrusions (as seen in the dykes at Porth y Post could be due to the surrounding rock removing the water from the magma.. We will have an interesting discussion when we go back to school

The path became steeper as we ascended, pillow lava formations could be seen on either side of the path. We stopped for lunch at Llyn y Gafr which was a well deserved break from our climb, before the final push to the reach the highest point of our ascent, Llyn y Gadair, on the way passing lavas and ashes of the lower basic groups. We could also see moraines deposited from glacier melts and basaltic tuffs - igneous rocks deposited in sedimentary beds. Ash from volcanic events builds up forming layers.

Our efforts were well deserved once we had reached the top and we looked down across the beautiful valley we had climbed. Llyn y Gadair and the area surrounding was the cwn, the head of the valley formed by glacial erosion. The sides of the cwn are extensively eroded scree slopes. The lake itself is a kettle hole which was formed by a piece of ice broken off from a retreating glacier. The ice melts leaving a hollow which is infilled with sediment and water forming the lake. We did not go any further than the lake as to get to the very top would mean negotiating the scree slopes.

We descended back towards the car park along the Fox's Path. We took a slight diversion to observe another feature where an igneous dyke and sill are visible perpendicular to each other.

Jonathan Wilkins thanked Graham Hall on behalf of all of us for such a enjoyable and interesting day out. We must also add our personal thanks to everyone at NWGA making us feel so welcome as guests of the group at this event.

Tom Lach & Eve Dunn

"Nantlle".

We have not received a formal write up of the trip led by Richard Birch to Nantlle in August. However Richard and Keith Nicholls have been discussing the question of the presence of a Chengjiang type fauna in North Wales for a few months, and in the course of that discussion Richard has commented as follows:

"We explored this concept on the field trip to Nantlle on 14th. It was especially successful because we ended up in Ty Mawr Quarry (west), where I have never looked for fossils, and within a few moments of arriving, Peter found a slab with three identifiable trilobite cephala in it, thus providing a direct correlation with Penrhyn. I had secretly hoped having a 'workforce' of volunteers might unearth something, but I didn't really expect it would."

"Escaping from Snowball Earth"
Ian Fairchild, Professor of Geosystems at the University of Birmingham, spoke to GeoScience Wales at the Royal Cambrian Academy in Conwy.

GSW put on a very well attended talk describing a number of theories relating to the palaeo-climate of the late Pre-Cambrian, and the associated global ice-house, often described as "Snowball Earth". Professor Fairchild's talk was illustrated by modern glaciological fieldwork in Svalbaard.

The first order controls on global climate are atmospheric greenhouse gases, solar insolation and albedo. With the apparent faint young sun hypothesis the escape from the global ice house conditions of Precambrian (Cryogenian) times is difficult to understand. Weathering of terrestrial rocks generally causes drawdown of CO_2 and would therefore be expected to cause cooling. Volcanism is a contributor over time to increased CO_2 in the atmosphere.

The influence of cyanobacteria may well be significant, and the presence of carbonates within the so called glacial episodes is curious. Dolocretes and stromatolites are also associated with these glacial episodes. I was left pondering whether the fact that the Gwna Melange includes stromatolites (see earlier report – Llanbadrig), and may well prove to be of late Precambrian age, may be something other than contingent coincidence.

Anyone wishing to read up on this subject may want to find a copy of Gabrielle Walkers "Snowball Earth" (published by Bloomsbury in 2004). Alternatively check out the Snowball Earth web site at: www.snowballearth.org.

KHN

Publications related to the Geology of Wales:

David I. Schofield, Joanna Potter, Sandra M. Barr, Jana M. Horák, Ian L. Millar, Frederick J. Longstaffe (2016) *"Reappraising the Neoproterozoic 'East Avalonian' terranes of southern Great Britain*" Gondwana Research **35,** pp.257–271

Dates for Your Diary:

NWGA:

Winter Evening Meetings

All meetings 7:00PM for 7:30PM start, at Pensychnant, Conwy, unless otherwise noted.

Thursday 10th November 2016
Stephen Parry
Parry Engineering Geology Services
"Assessing the hazard of low frequency, high magnitude landslide events; the role of the engineering geologist"
see abstract elsewhere in this Newsletter

5th Annual Joint Meeting of the Association with the Geological Society of London (NW) and the University of Chester.

Room CBB115, Best Building on main Chester campus, University of Chester. Tea & Coffee from 6:30PM, Lecture starts at 7:00PM. (NB this is further into the campus than previous meeting locations)

Wednesday 23rd November 2016
Jim Richards www.jimrichards.com.au
"Gold Rush: Prospecting and Small Scale Mining for Gold and Diamonds to the Present Day"

Wednesday 7th December 2016
"Annual Member's Evening"
Please contact Keith Nicholls with offers of short talks, slide shows, etc. A selection of drinks and nibbles will be available.

Saturday January 21st 2017
"Annual General Meeting"
Location and Speaker to be confirmed

Other Groups Events:

GeoScience Wales

(meetings generally held at Royal Cambrian Academy, Conwy)

September 22nd (N.B. 4th Thursday) : Martin Cox (Aberdeen Drilling Management):
"Magnetic Susceptibility – the next major step forward in core and wireline logging? (Can you really infer petrophysical parameters from magnetism?)"

October 20th Graham Potts (University of Liverpool) Details TBC

November 17th: Ruth Siddall (University College, London) Details TBC

December 15th: Tim Needham:
"Reservoir Scale Deformation and Advances in Fault Seal Analysis"

Please confirm attendance in advance by e-mail to: admin@geoscience-wales.co.uk

GSOL – North West Regional Group

29th September *"The Geological Map – Its development, the British Geological Survey and the future"*
Dr Andrew Howard (British Geological Survey)
Manchester University

20th October 2016
"*The BVG as a potential host rock beneath West Cumbria"*
John Black
Manchester University

8th December 2016
"Control the Drainage: the Gospel according to Sinkholes"
Dr Tony Waltham
Manchester University

Liverpool Geological Society

Tuesday 25th October
"Member's Evening"
More details available from
Dr Maggie Williams, Department of Earth, Ocean and Ecological Sciences, School of Environmental Sciences, Herdman Building, 4 Brownlow Street, University of Liverpool, Liverpool, L69 3GP.

National Museum of Wales (Cardiff)

Until 31st December
Exhibition *"Wales's Newest Dinosaur"*

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/cdgc/index.html

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/

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