



Cymdeithas Daeareg Gogledd Cymru

North Wales Geology Association

NEWSLETTER

Issue 89

September 2015

Inside this issue:

Chairman's Message 3

Articles 4

Lantern Slide Images from Barmouth

A temporary exposure of Ordovician sediments near Betws y Coed

What's this then?

Naming the Hirnantian Stage of the Ordovician

A Moho you can drink

Invitation to visit Craig Rhosyfelin: Quaternary rockfall site or Neolithic bluestone quarry?

Reports 15

Publications related to North Wales Geology 17

Dates for Your Diary 17

Web Site and Social Media 18

Committee Contacts 18

Front Cover Images:

A Magic Lantern glass slide from circa 1900, showing the submerged forest on the beach at Llanaber, just North of Barmouth. The full image is included as a brief article by Jan Heiland.

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

Colour Hard copy reproduction courtesy of:



Chairman's Message

The evenings are drawing in, and it's time to resume our evening meetings. I hope that you have all enjoyed your summer season, and that it was not too disturbed by the unusual patterns of the Polar Jetstream. August has proved to be an unusually cool month in Deganwy, with temperatures below 10C on a number of nights, and relatively few excursions above 20C during the days. The tomatoes in our greenhouse are determined to stay green, and our Sylvan blackberry is still cropping over a month later than normal. Interesting times indeed!

Last time my wife and I were in Connemara we suffered a heatwave, but this time a strong, cool north-westerly was feeding in regular showers, mostly overnight I must say, and a couple of gales from southerly quarters gave us some spectacularly rough seas. One characteristic of the area is the abundance of rocky reefs and knolls far out to sea, so that at times an almost unbroken line of surf circles almost the entire horizon. Local inhabitants tell us that it is well known, and a sign of just how rough the weather is - though with few predictive indications. Having always stayed on the granite outcrop previously, it was unnerving at first to see nothing but sheared, metamorphosed gabbro in its place, but there is no doubt that it is a more interesting rock due to the white and

grey-green colours and deformation that they demonstrate. Proximity also meant that it was possible to visit actual outcrop of the famous Connemara Marble, and very interesting it turned out to be as there were much more varied facies than demonstrated by the ornamental green material that is traded today. However, once again it was the Quaternary which proved to be most rewarding, since the area further north and west proved to be a treasure trove of fine sub-glacial landforms which are entirely lacking on the granite outcrop.

An area so photogenic just cried out to be included in the annual photographic competition of the Geologists' Association, so you will not be disappointed to hear that I have submitted an entry in hope of emulating the success of Gary Eisenhauer, our Meetings Secretary, who featured in their current year's calendar with his image of the 'fossil forest' of Borth-y-Gest. The competition is open to absolutely anybody, so long as they are not a professional photographer, and there can be up to three entries on paper prints up to A4 in size. I went to Boots in Llandudno to make my print, and I have never before used one of the DIY terminals that are commonplace these days. I came away with a respectable print, which the assistant concluded must be Barbados (wot, no palm trees?), at a very reasonable price considering the faff that I used to go through for a mere black & white print in my

darkroom. You still have time for a submission, since the closing date is 25th September and a first prize is worth £100 - full details are online on their web site, and you can download the entry form to submit with your print(s). The pictures do not have to be from this year!

We look forward to the indoor season of lectures, some of which are fully organised but not yet publicised. If you have any suggestions, please contact any of the committee with your idea, and I know that Keith is always on the lookout for material. He particularly likes people to contact him with 'finds' and conundra, which often spark a lively discussion. We are also looking forward to the December social meeting that proved to be so successful last year, so please consider bringing along any interesting material to share, or indeed your pictures or memories. In exchange, we will bring along a reward of refreshments.

We look forward to your company.

Jonathan Wilkins

Articles:

Lantern Slide Images from Barmouth

The following two images have been scanned from Victorian lantern slides showing exposed fossil forest at Llanaber just north of Barmouth.



Jan Heiland

A temporary exposure of Ordovician sediments near Betws y Coed

From time to time, construction works expose sections which would otherwise not be visible. Just such an event occurred in March 2015 at Coed Maesnewyddion. Forestry operations required re-excavation of a quarry at SH 756 565, and a large area of dark grey sedimentary mudstone in bedrock described by my geological map as ‘Ordovician: Caradocian’, and part of the Nant Ffrancon Sub-group (Rushton 1999), was exposed (Figure 1).

undetermined bedding. Tectonic processes are evident: the rock in the upper part of the quarry readily splits along cleavage planes. Lower down it fractures into parallel-sided blocks and cubes, much preferred as a material for tracks. Occasional veins of quartz and pyrite are visible, and phosphatic ‘lenses’ suggest that there was volcanic activity nearby at the time of sedimentation. By the Caradocian, the Iapetus Ocean was much reduced in width, and Welsh fauna was now broadly comparable with its Scottish counterpart. Dark mudstones such as these are abundant in the Ordovician of the Welsh Basin.



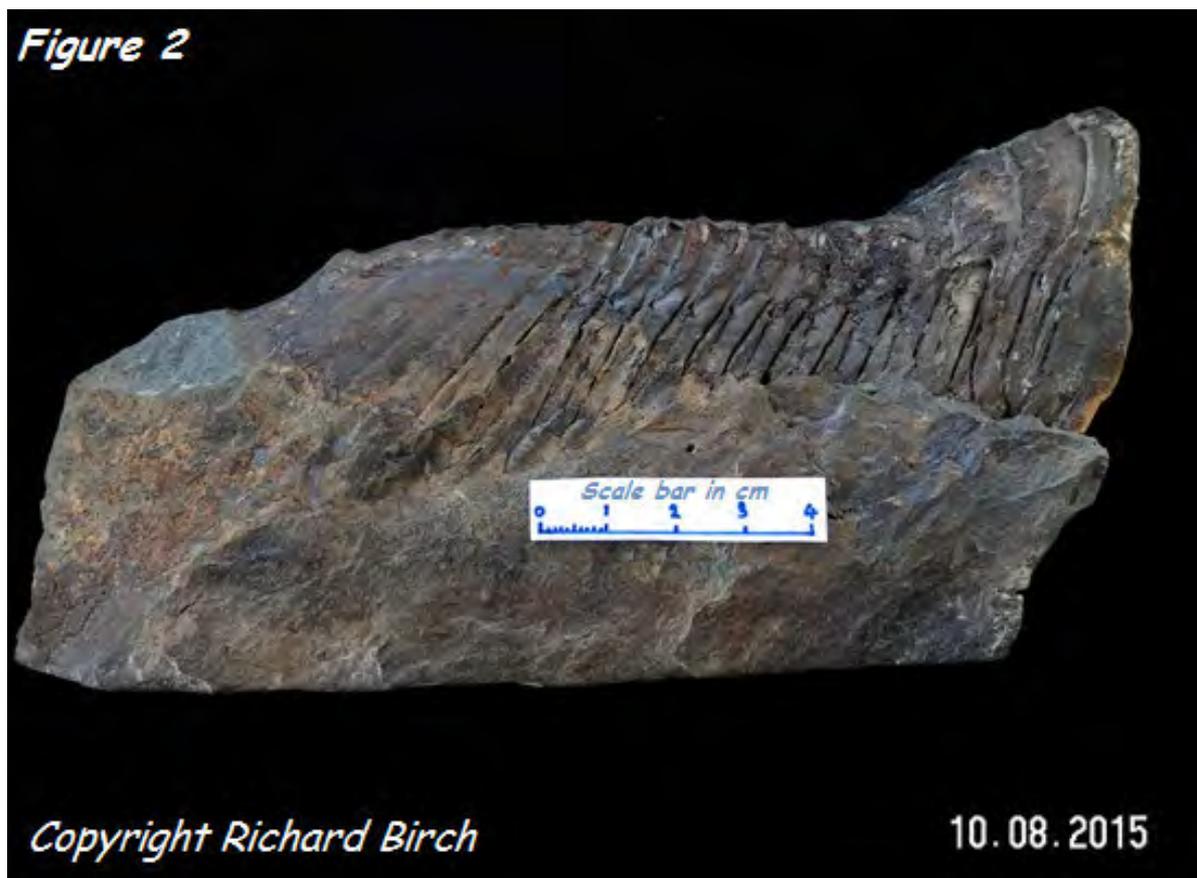
At first glance, the exposure is not particularly exciting, being a uniform dark grey mudstone, weathering to brown and with

The rock is sparsely fossiliferous: brachiopods occur throughout, but cleavage often renders them impossible to extract. The

Geological Survey volume for this area notes this quarry and indicates that a fauna of brachiopods and occasional trilobites indicative of Caradocian age had been recovered. Until recent works began, it would not have been possible to confirm this, but the opening up of the quarry has exposed a richly fossiliferous seam dominated by brachiopod genera identified as *Dalmanella* and *Heterorthis*, although the species are not determined. They are very abundant in distinct layers, along with the remains of trilobites and more rarely orthocone nautiloids and other fossils, but they show little sign of having been transported far. They are, however, highly distorted.

throughout the period of works (which ceased in June with Natural Resources Wales attempting to landscape the section to minimise hazard). Between April and July 2015, the fossiliferous section was explored to find out if it would yield any identifiable fossils other than those described in the Geological Survey account.

Primarily it was the trilobites that were of interest. The Late Ordovician (Caradoc to Ashgill) represented probably the pinnacle of trilobite diversity and hundreds of species are known, occupying every ecological niche. However, the rock at Coed Maesnewyddion contains



The quarry is easily accessible and was not closed to the public

few of these, and, commonly, only one: the trilobite *Brongniartella* cf.

bisulcata⁽¹⁾. Pygidia – the fused segments comprising the tail – are the most common, and their size indicates that this was a substantial trilobite. This was confirmed on 8th July 2015, when a fully articulated specimen (minus the head) was recovered (Figure 2). It measured 132mm in length. Add the head (cranidium) to this, and the specimen would have been in excess of 15cm long. A well-preserved cranidium is showed in Figure 4.

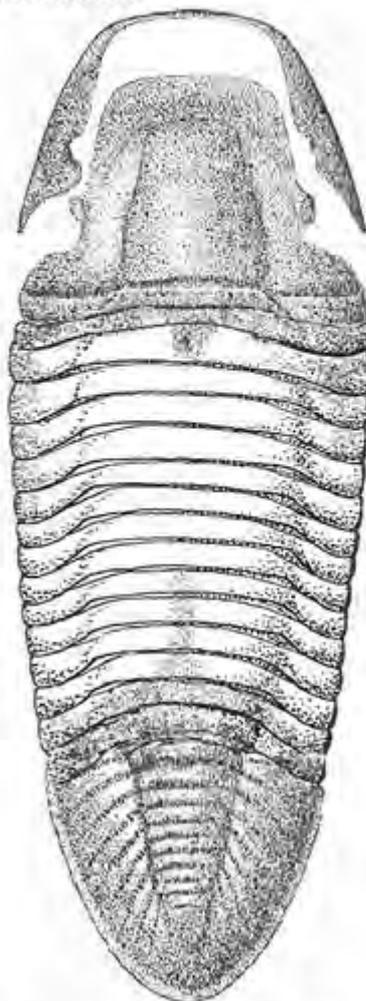
Reconstruction of *Brongniartella* is based on the illustrations from the Treatise of Invertebrate Palaeontology (Harrington 1959) which includes *Brongniartella* in the sub-order of trilobites called the Homalonotinae and features drawings of a disarticulated cranidium and pygidium. The illustration is invariably copied in other publications and no complete picture exists, so I have attempted my own (Figure 3). All specimens from Coed maesnewyddion have 12 articulating segments.

In addition to *Brongniartella*, there is a much smaller trilobite that may be tentatively assigned to the species *Gravicalymene cf. pontilis*, which was formerly known as *Flexicalymene cambrensis* in reference to its abundance in the rocks of Wales (Figure 5). However, there are many species of *Calymene*, and the genus is in need of detailed

revision. I have favoured ‘lumping’ these specimens with those known from the Geological SSSI at Cynwyd near Corwen (Rushton 1999), which is of similar age.

Figure 3

Reconstruction of *Brongniartella* showing disarticulation of the anterior border which occurs during moulting, and explains the frequent ‘squared-off’ cranidia that occur at this location.



Copyright Richard Birch

The indications from this site are that it represented turbid waters still within the range of surface light (*Calymenids* and *Brongniartella*

(1) In the Geological Survey for the District of Snowdonia, the species recorded from hereabouts is *Brongniartella minor*, but in the absence of a detailed description the more widely-known *B. bisulcata* is favoured.

both have small eyes) deposited in calm conditions. The fossiliferous seams may represent periodic 'slumps' from shallow waters, but it is more likely that this represents a resident fauna, evidenced by brachiopods with both valves intact.

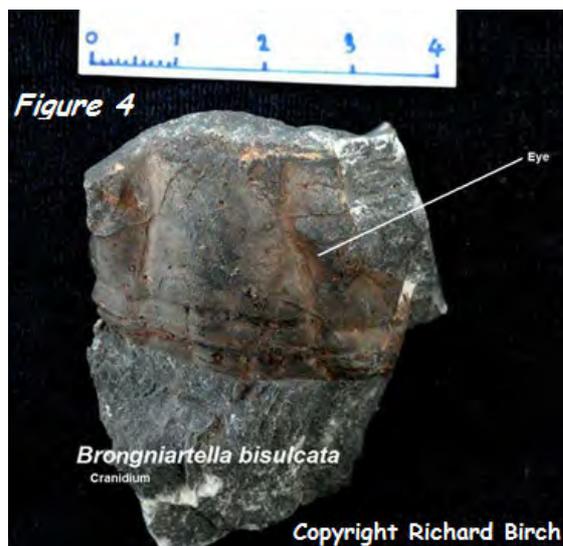


Figure 5



The site is not worthy of SSSI status owing to its lack of geo- and palaeodiversity, but it has provided some good quality material of a trilobite mostly known only from incomplete specimens.

Richard Birch

References:

Harrington, H. J. (1959). *Treatise on Invertebrate Palaeontology*. Part O, Arthropoda, University of Kansas Press.

Rushton, A. W. A., Howells, M.F. (1999). *Stratigraphical Framework for the Ordovician of Snowdonia and the Llyn Peninsula*, British Geological Survey.

Rushton, A. W. A., Owen, A.W., Owens, R.M., Prigmore, J.K. (1999). *British Cambrian to Ordovician Stratigraphy*, Joint Nature Conservation Committee.

What's this then?

This is a photo that I took about 15 years ago, high on the flanks of Elidir Fawr above Llanberis, in the broken boulder-scrub that is mostly Carnedd y Filiast Grits (upper Cambrian) and Graianog Sandstone (basal Ordovician) - units famous for the Cwm Graianog Trilobite *Cruziana*. This boulder is in a huge debris field down the SE face of Elidir Fawr at around 2,400 ft, Map Reference approximately SH 607 607.

I found it by accident when I was looking for the wartime crash site of the Blackburn Skua, just below it. It is an awful slog up to it, but I did take reference photos to line up on local topography which I am

confident would put anyone within 50 yards of it.

than 50mm deep - as if the whole sequence has been compressed and



I am as sure as I can be that this boulder is covered in flattened Trilobite burrows. From the same beds I also have a sample that I think is an infill cast of a Trilobite nest at the end of a burrow, with possible *Cruziana* and Trilobite legs showing through. I have looked at this photo many times and still don't understand it. In all honesty, my first thought on seeing it was that I'd come across part of a carved Celtic cross with a typical interwoven design!

From my best memory, all the trace marks (have no idea what I should properly call them) constitute a single bed on one flat face of the boulder, measuring not much more

flattened. If these are burrows of some sort, then they are very much flattened. I can't think of any process other than biological that would have created these marks - they look so simple, but are actually very difficult to explain!

Jan Heiland

Naming the Hirnantian Stage of the Ordovician

By an unusual set of circumstances I came across interesting information about the naming of the uppermost, Hirnantian, Stage of the Ordovician, the subject of two NWGA field trips led by Keith Nicholls:

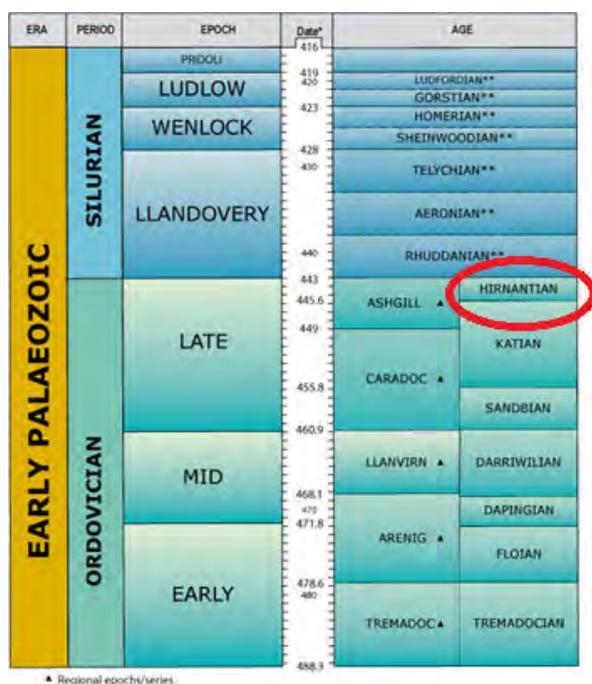
I recently bought a book by David Adams, on the History of Limestone Mining in Church Aston and Lilleshall near Newport, Shropshire (where I went to school!). He is a long standing member of the Shropshire Caving and Mining Club and has incorporated the links with the early connecting canals in his book, originally published in 1970 but completely revised in March 2007

By a quite unrelated route, via the Weaverham History Society and the Northwich and District Heritage Society (of which I am a Committee member) and their interest in local WW1 heroes, Adams' wrote that he had traced a distant relative as Mary Anne Beeston, born in 1869 at Market Drayton. In 1888 she married William Bancroft of Northwich. They had three sons between 1890 and 1897, George, Geoffrey and the third, John Bevis Beeston Bancroft. In 1900 the family moved to Weaverham, near Northwich. All three brothers served in, and survived, WW1 and Bevis, though seriously injured, afterwards became an eminent palaeontologist.



Cwm Hirnant - copyright Keith Nicholls

In 1933 he proposed the now internationally accepted name for the uppermost stage in the Ordovician Period, as the Hirnantian, after Cwm Hirnant, south of Bala, where he had been studying the fossil fauna. Our Editor, Keith, who has led two field trips to the area (reported in Newsletters 71 and 88) seems to be following in Bevis's footsteps for his PhD research!



Whilst the upper and lower dates and fossil definition of the Hirnantian have changed the name remains. It is a short Stage of 1.9 M years duration, but it is extremely significant for its dramatic events involving a mass extinction, global climate change, expansive glaciation and sea level fall. Its fossil distribution is worldwide and in Bancroft's time was defined primarily by the *Hirnantia* Fauna comprising brachiopods and

trilobites. Today its' stratigraphy is primarily based on graptolites found in China and Scotland, although the *Hirnantia* Fauna is still locally important where shallow shelf successions are found.

Bevis discovered a new species of trilobite. His fossil collection was purchased by the British Museum (now the Natural History Museum) in 1936 and he published important, now rare, papers on his fossil findings.

Seriously wounded in WW1, Bevis was nominated for the Croix de Guerre. It appears he served in 342 Siege Battery leaving Southampton for Le Havre on 29 May 1917. Having survived WW1 he sadly drowned in Normandy while serving in the Royal Observer Corps in WW2 in 1944.

David Adams has recently published his 140 page transcription of Geoffrey Bancroft's daily diary of his experiences in WW1 in France as part of the 100 year commemoration of the Great War.

David also holds some of Bevis Bancroft's original field work notes, and it is very much hoped that these will be made available to our Membership in the months and years ahead – so watch this space!

Fred Owen

Editors Note:

Base and top of the Hirnantian Stage are currently defined by the First Appearance Datum (FAD) of, respectively, *Normalograptus extraordinarius* (Global boundary stratotype at Wangjiawan, PRC), and *Akidograptus ascensus* (Global boundary stratotype at Dobb's Lin, Scottish Borders).

Bancroft was responsible for the formal description of at least three species of the trilobite genera *Onnia* – specifically *O. superba*, *O. cobboldi* and *O. gracilis*.

Reference: Bancroft, B. B. 1929. *Some new species of Cryptolithus (s.l.), from the Upper Ordovician*. Transactions of the Manchester Literary and Philosophical Society, **73**, 67–98.

A MOHO that you can drink

Not many folk faced with a beer named “MOHO” ask us what our connection is with geology, except for the geologists among you. Bragdy Mantle / Mantle Brewery have been trading for just over two years from brewery site in Cardigan town, and for us to tell you what led to us naming our fourth beer “MOHO” it is important to let you know a bit more about ourselves.

Mantle, the brewery name was chosen from the days when Ian, our head brewer was brewing at home on the stove. For us beer has always

been a wholesome natural product intrinsically linked to our planet. Therefore as our aromatic whole hops boiled up in the wort (sweet liquid extract from the malt) it seemed obvious at the time that this could represent an image of the Earth's mantle and so the brewery was named.

Most of our beer names are not linked to geological connections but when looking for inspiration for choosing a name for our 4.3% Pale Ale, a close friend made a proposal after looking at some cross sections of the Earth. His suggestion will be no surprise to you, it was “MOHO”, we were going to use the full name of the Mohorovicic Discontinuity but luckily we ran out of ink. We instantly loved the name “MOHO” and when our designer came up with the imagery we were sold on it instantly.



MOHO is now one of our bestselling beers, pale to golden in colour, aromatic and to taste it has hints of fruit combined with a well-balanced bitterness.

We hope you get to enjoy a pint of MOHO sometime soon!

*Ian Kimber
Mantle Brew Crew.*

Editors Note:

I have personal experience of this particular brew – having come across it near its home at Llangrannog, Ceredigion.



So far I have only managed to get hold of the bottled version (see above) but can vouch for Ian's description – a well balanced honey coloured pale ale – and one is hardly enough. (Drink responsibly!!!)

Invitation to visit Craig Rhosyfelin: Quaternary rockfall site or Neolithic bluestone quarry?

Craig Rhosyfelin, Pembrokeshire, (SN 1173 62) is a rhyolite crag or spur located within a meltwater gorge, not far from the village of Brynberian. It is unusual, but not unique in Pembrokeshire, lying at the junction between a large meltwater conduit and a subsidiary channel which is both humped in profile and arcuate in plan. The exposed rock face within the minor channel is currently the subject of an interesting dispute between archaeologists and geomorphologists - and further informed opinion is needed if there is to be a resolution.

The site has been given a RIGS notification (awaiting formal designation and listing) on the basis that the meltwater channels (assumed to be Anglian in age) contain moulded rock surfaces and a sequence of Devensian till (with faceted and striated cobbles) and later deposits including scree and rockfall debris, torrential fluvio-glacial gravels, periglacial "head" and Holocene slope deposits. There are many erratics in the sequence, although most of the water-abraded boulders and broken slabs are of local origin. There are very few inland sites in West Wales where sequences such as this can be seen

and studied. The site is also important because the rock face (made up of multiple exposed foliation planes) has been identified by geologists Richard Bevins and Rob Ixer as the source of a very unusual foliated rhyolite, fragments of which have been found in the debitage at Stonehenge.

On the basis of the petrological provenancing work, archaeologist Professor Mike Parker Pearson and his team started to investigate the site in 2011 with a view to discovering whether it might have been a Neolithic bluestone quarry. Almost immediately they found an 8-tonne rhyolite block embedded in rockfall and other sediments, some 5m away from the rock face, and pronounced on the basis of its size and orientation that it was a bluestone monolith and that the quarry hypothesis was confirmed. Since then, there have been other digs in 2012, 2013 and 2014, with meticulous recording of the arrangement of rockfall slabs and fragments and of the sediment sequence. Other "evidence of quarrying" mentioned in lectures has included hammer stones, scratched and crushed rock surfaces, rock "railway lines" and rock pivots and props. Organic samples have been taken for radiocarbon dating, but no excavation reports or other notes have been published.

No geomorphologists have been involved in the archaeological dig. The handful of Quaternary

specialists who have visited the site since the pit was opened have expressed the view that all of the features examined are entirely and are consistent with the operation of glacial and other processes since the Anglian glaciation, in line with an established West Wales chronology.

There is now an impasse between those who subscribe to the two schools of thought! However, Prof Mike Parker Pearson has kindly agreed that during the 2015 dig (scheduled for mid-September) he will welcome QRA members who might wish to visit the site and examine the sediment sequence and landforms. Suggested dates are the weekend of 12/13 Sept or the weekdays of 14/15/16 Sept. Alternatively, the dig site is currently open and is easily accessible adjacent to a public footpath; if anybody wishes to visit the site outside the dig season, for example in August or October, Dr Brian John will be happy to act as a native guide. Time is of the essence in this case; it is possible that the archaeological dig pit will be filled in and the site "restored" at the end of the September 2015 digging season.

If you are interested in visiting the site, please contact Brian John, details below.

For further information contact Brian John (brianjohn4@mac.com) Tel:01239-820470.

Requests to visit the site during the forthcoming (September) dig contact Mike Parker Pearson (m.parker-pearson@ucl.ac.uk).

Professor Parker Pearson will be giving a lecture on the significance of Rhosyfelin at Castell Henllys (National Park Education Centre) on Wednesday 16th September at 7.30 pm.

Reports:

30th July 2015

GeoScience Wales Field trip

“The Great Orme Bronze Age Copper Mine”

As a member of NWGA I received an e-mail invitation to join this evening visit to the 'Ancient Mine', and as I had not revisited it since the NWGA trip many years ago I readily accepted the invitation.

What a remarkable evening we had! In the late 1980s the local council had decided to tidy a waste tip on what was known to be the site of an old Victorian copper mine and turn it into a car park. Concerns were expressed however, about the unknown nature of this landfill. As the Council certainly did not want to run the risk of visitors' coaches and cars suddenly starting to disappear into unknown voids beneath their new car park, an investigation of the site was then implemented.

What a surprise awaited the team, they easily found the old main shaft

(Vivian's) that went down 175 metres, but as removal of the Victorian mining waste (etc!) continued, entrances to many tunnels in the cliff face were exposed. These entrances (initially thought to be of Roman origin) were so interesting that excavation/exploration of them commenced, on what looked (and has since proved) a much more promising visitor attraction than a mere car park!

The intervening 28yrs have revealed an extensive network of tunnels leading to at least nine levels of workings. Not only that but also vast quantities of primitive mining tools;- antlers, animal bones (various) and stone hammers. Radio carbon dating of these artefacts showed that this was not a Roman mine, but one of the Middle Bronze Age (1600 - 900 BC).

At least 5km of these ancient workings have so far been excavated but it is felt that this is only between about 2 - 5% of the total! Being an archaeological site these excavations need to be done with proper care and attention and are therefore not fast. My offer of becoming a volunteer and helping to explore deeper was most politely declined!

The copper ore discovered here was malachite and was soft enough to be worked using animal bones/antlers. This was a different copper ore to that found in Parys Mountain which had been intruded into a much

harder rock and, although an appreciable deposit, was nowhere near as easy to work as that found at the Great Orme mine. It is also felt that the Parys Mountain mine pre dated and was probably worked out before the Great Orme mine was started. In the Great Orme the copper had intruded into north - south faults in the limestone with which it had reacted to form the relatively soft malachite ore. This reaction with the local rock also gave the resulting copper a quite distinct isotopic signature which has allowed tentative (the research is continuing) identification of ancient bronze tools found, not only in Britain but also in Europe, as being made with copper from the Great Orme copper mine.

My mental image of the Bronze Age folk has changed profoundly as I started to appreciate the curiosity, intellect, ingenuity and the depth of knowledge these folk must have had in order to extract, smelt, refine, and even alloy with tin! this ore. We were shown (on recent and much edited, video footage) that even obtaining copper prills from the malachite was no easy task. We were told that it took about 45 minutes of non-stop pumping of both bellows to raise the temperature, of the typical 'primitive!' open hearth furnace that was used, to a high enough degree to achieve any results. And that was just the first step in the process!

The well established trade links with not only Europe but also the tin miners in Cornwall showed what a fairly civilised folk these Bronze Age peoples must have been. No longer were they the primitives so beloved by the illustrators of children's first history books but; these were folk who had settled, with a working social structure into small agricultural based communities, each of which had then also established a network of diverse trade links with others. Using their intellects, skills and ingenuity, and the so abundant and readily available natural resources, they had progressed out of the Stone Age, and their descendants then took them/us into the Iron Age and beyond, to where we are now.

I cannot help but wonder what those intelligent and so peaceful folk would think of what we have made of the world in the four thousand or so years since they were around. Especially now as I write, in August 2015, as we remember the devastating effect of the (now considered relatively crude/simple) atom Bombs dropped on Hiroshima and Nagasaki seventy years ago. Being aware of the technological knife edge on which we are all now standing/relying, this visit into our so distant past has forcibly brought home to me that if we were to return to another Stone Age, (which is where any use of nuclear weapons would quickly take us and) because we have raped and polluted this little planet of ours so badly, that is

exactly where we would stay. With no more abundant and readily available resources left, we would have neither the means nor indeed any hope, of ever escaping.

Further details of the Mine and the on-going research mentioned above can be found on the website - www.greatormemines

Frank Buxton

Publications Related to North Wales:

Pothier, Hayley D, Waldron, John W. F. Schofield, David I. DuFrane, S. Andrew; (2015) *Peri-Gondwanan terrane interactions recorded in the Cambrian–Ordovician detrital zircon geochronology of North Wales*, Gondwana Research, Vol 28, Issue 2, pp. 987-1001.

Dates for Your Diary:

NWGA: 2015/2016 Programme

NWGA Meetings

Thursday 22nd October, 2015

Dr Ian Stimpson (Keele University)

“Bridgmanite, plate tectonics and mantle convection”

TBC University of Chester 6:00PM for a 6:30PM start.

This is a joint meeting with the North West Regional Group of the GSoL

Wednesday 11th November

“To be confirmed”

Pensychnant, Conwy, 7:00PM for 7:30PM start

Wednesday December 9th, 2015

“Members’ Evening”

Pensychnant, Conwy, 7:00PM for 7:30PM start

Liverpool Geological Society

“LGS Members’ Evening”

Tuesday 27th October, 2015.

If you are a member of the LGS and would like to offer a talk or presentation, please let Maggie Williams know by emailing: hiatus@liv.ac.uk or sending a card or letter to: 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.

The evening will include at least one talk relevant to North Wales *“The Hirnant Limestone – Up close and personal”* (KHN)

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 19th and 20th, 2015 (one week earlier than previously advertised)

“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>

Oriel 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: 01492 596255 or 07732 745945

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

keithnicholls@gmail.com

or keith.nicholls@opusinternational.co.uk