

Cymdeithas Daeareg Gogledd Cymru

North Wales Geology Association

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Issue No 73

NEWSLETTER

November 2012

Sand Politics

*"If seven maids with seven mops
Swept it for half a year,
Do you suppose," the Walrus said,
"That they could get it clear?"*

The Carpenter replied that he thought not, but his opinion may have differed if he had spent his holidays in Llandudno - as Alice Liddell (supposed model for Alice in Wonderland) was wont to do. It is held locally that the demolition of the house where Alice's family spent time by the West Shore of Llandudno has degraded the association, of which so much is made by the local tourist agencies, between Alice of Looking-Glass fame and the town. I think that there will be little effect when it is compared with the problems caused by both sand AND the lack of it.

Front pages of the North Wales Weekly claimed recently that holidays have been ruined by the lack of sand on the North Shore, and that major hotels have been forced to cancel sandcastle competitions for the same reason (though why they were suggested is a valid question, since this is not a new problem). "Ho-ho" say the good burghers of Penmaenmawr "why not come here instead - we have loads". And this week we read that some councillors are desperately seeking the re-building of the wooden groynes that used to divide the shore because there was always sand until the groynes were removed as part of the great defence scheme which saw the upper part of the beach buried in thousands of tons of alien rubble. It seems that the same councillors are actually blaming the construction of the Watersports Hotspot

in Colwyn Bay for the misfortune, although the NWW is subtly ambiguous on this report in its usual sub-grammatical way.

So, they should think themselves lucky when the woes of the West Shore are recounted. They are inundated in sand, which covers the flower beds, blocks the drains, buries the coastal cycle path and forms dunes which head off down the road towards the pier. Recently the Council were granted permission by the Environment Agency to put the sand they clear from the roads and paths in a lorry and dump it back on the intertidal flats from whence it came. Councillors here were equally strident, and called for a "permanent solution to the sand problem, once and for all". The Bishop of Bangor's 13th century palace at Gogarth forms an object lesson, as it has recently disappeared almost entirely through erosion, and the fields where his cows grazed are now the very sand flats in question. Perhaps abandonment was not the solution the councillors were seeking, but it would be permanent.

So the processes of change are all about - and my question is this: what will the councillors say when the sea threatens to flow down Gloddaeth Avenue as it surely will in the fullness of time?

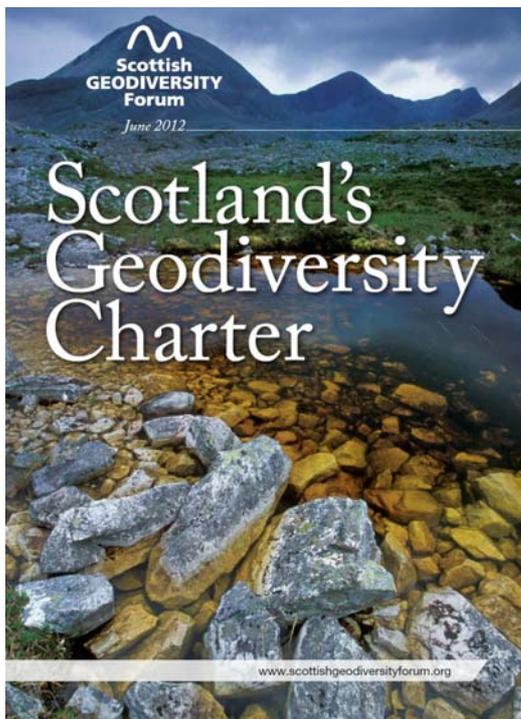
Not a problem before the next AGM, of course, and everybody is encouraged to come along to have their say. We have a fine venue, excellent refreshments and an exciting talk lined up, and it won't be the same without you. See you in January.....

Jonathan Wilkins

Articles:

Scottish Geodiversity Charter

Our Geodiversity Charter seeks to get organisations and individuals in Scotland working together to raise awareness of our amazing geodiversity and ensure it is recognised in policy and practice. The Charter was launched by Scotland's Environment Minister in June, and has been signed by more than 30 organisations including key national bodies, the National Parks, several local authorities, geological societies and geoconservation groups.



The background to this is a long drawn-out process to persuade government and local authorities to value and protect local geodiversity. A petition to the

Scottish Parliament in 2009 sought a statutory 'geodiversity duty' for the efficient collection, analysis and sharing of geodiversity data to inform better decision making processes. This was ultimately unsuccessful, with the government unwilling to impose a duty that would have a financial burden on local authorities. However it laid the groundwork, along with reports by Scottish Natural Heritage (SNH) and BGS, for a different way forward that encouraged working together and greater awareness.

In a short space of time, the charter was drafted and put out to consultation. The Forum was given a lot of assistance in this from SNH and BGS, and also the Natural Resources Division of the Scottish Government. We needed this support, given that we are a small, recently-formed organisation of volunteers and little money! What was heartening about the process was the willingness to engage from a wide range of organisations and recognition that geodiversity deserves more support. These organisations have now signed up to a vision that geodiversity is important at many different levels, and that it needs to be safeguarded and managed. The Charter includes a range of actions to be carried out by different sectors, from individuals, land owners, local authorities, industry and the education and research sector.

This is very much a document that we are determined to make the most of, not a job finished and on the shelf, but a stepping stone. Our next conference, on 17 November in Perth, will focus on taking the Charter forward. The Charter

working group is continuing to meet, and we have plans to raise further awareness of the Charter and encourage more signatories and to develop support and resources that will enable organisations to take the Charter forward. We plan to report annually on progress.

Certainly at this stage we can report that the Charter has been widely recognised as a positive step, and has got us known within government; already this has proved positive in on-going consultation about the Scottish Biodiversity Strategy, which should have geodiversity embedded within it for the first time. It is also a good starting point for discussions about issues relating to geodiversity, for example the current stamash around plans for a waste disposal pipeline next to Siccar Point.



The proposed pipeline cuts across the exposed foreshore in the middle distance. Siccar Point is to the left (west) of this view point.

We would certainly encourage other parts of the UK to look at what can be achieved by non-binding charters that encourage co-operation and recognise what is already being done. We claim the world's first ever Geodiversity

Charter, and it would be great to see more ...

Angus Miller

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Communicating Risk: How certain are we about being uncertain?

Geology is a science, but not what one would define as an "exact science". While we are increasingly applying mathematical principles to geology, one of the biggest challenges is quantifying how well we understand the natural world. This is frustrating for us, but is even more frustrating for the public and industry who want accurate information on which to base decisions. The most obvious example in the natural sciences is in weather forecasting, which is increasingly accurate and is fed by satellite imagery and complex numerical models, but is subject to error. This feeds into climate modelling for which international agencies are adding and modelling more and more variables but for which uncertainties remain.

In geology we define geological contacts between units and we place a line in a map when we have identified this in the field, in most places the contacts are inferred and are shown as dotted lines. The extrapolation to depth is even more uncertain and can be improved by geophysical measurements and validated by drilling.

In general that is how geology works, mapping of units from satellite images and aerial photos, validation in the field and presentation in a geological map; which is now a digital map and is increasingly a 3 dimensional digital geological map. Where resources need to be defined the mapping is followed up by geophysical images and ultimately by drilling to define the true geological contacts.

This is the bulk of the geologist's job and we know what the confidence is in our geological images and geophysical models. The challenge is communicating this to the public in a world where we will be increasingly using the subsurface space to build, to store things such as gas and heat, to extract resources and to secure nuclear waste and avoid emission of waste CO₂ from power stations by underground storage. There is no doubt that public pressure on defining the environmental consequences of these activities is increasing and geologists will be required to provide robust models of the subsurface if we are to convince them about the science that we do.

BGS is working on creating a 3 dimensional geological map of the UK which will vary in resolution depending on where you are in the UK. It will be high resolution below the major cities where the upper 100's of meters are critical for construction, ultra-high resolution in the proposed UK nuclear waste repositories, potential CO₂ storage reservoirs and in future areas of resource exploitation. In other areas BGS will focus on high level landscape models allowing for protection and understanding of the UK geological

heritage, farming development and modelling of flood risk and other natural hazards.

Only where we have observed a geological contact will the locations be exact; otherwise we will always need to infer contacts and build geological scenarios to the best of our abilities.

Professor John Ludden

British Geological Survey

This article was first published on the BGS web site (www.bgs.ac.uk)

A letter from Sedgwick (iii - continued)

In the last Newsletter we left Sedgwick in full flow lambasting Murchison, and other Survey geologists, for the manner in which they had treated his work; but seemingly of perhaps more particular concern to Sedgwick, was their apparent misunderstanding of some of the most basic elements of his classification. The letter continued....

"I think it was in the autumn of the same year (but I cannot be certain) that I learnt from De la Beche something about the unconformity and thinning off of the so-called Caradoc, which in point of fact was not represented in the Llandeilo sections. This delighted me, for the Llandeilo sections (after my visit in 1846) still presented a very great difficulty, which would be cleared away by the unconformable overlap of the group over the Llandeilo saddle and on the south side of it. On this point I wrote more than once to Jukes, who told me they had given up the notion of unconformity – that the sequence was unbroken etc. this news bothered me,

and I did not believe it; and when the great map of the survey appeared, two years since, I felt as certain as I could do of my existence that the yellow colour (called middle Silurian) was the colour of a great unconformable deposit between my Cambrians and your Silurians. It did however appear that the yellow colour included two groups of fossils – one undoubted Silurian (or Wenlock) – the other undoubted Cambrian (eg Caer Caradoc section). If this were true there must be an overlap, and in the intervening yellow colour the fossils of the two systems were inextricably blended. I believed in this overlap, because you and Phillips, and the naturalists in the Survey asserted it. I do not blame you, because you leant on the naturalist's determination; but it is impossible not to say that herein Salter and Forbes very strangely blundered – the more to be wondered at because Phillips had stated the leading facts quite correctly though he had not (as it seems to me) the moral courage to draw the legitimate conclusion from his own excellent premises.

I am writing ding-dong to save the early post, and I have overshot my game, for I was very frankly telling you what had set my back up, after there was a dispute between us. After the Government map was out, I could no longer stand idle. I stood to my guns, and brought my case fairly out. I have read the paper over, and I think, in fact and language it is reasonable and not disrespectful to any one, and that the Council made an egregious blunder when they ordered it to be burked after it was printed. This was a grievous personal insult, by no means wiped off by withdrawing the foolish order. I have a copy of the order;

and if it be directed against me (and my name only appears), it contains an assertion that is false (I write the plain world advisedly), for it states that I had not complied with the rules and directions of the Council, or words to that effect. The assertion may however apply to someone else. I mean (now that I have been permitted to see the Minute) to demand of the Council, not as a favour, but as a right, that the order be expunged, or at least, that a note be entered on the same page to the effect that the person alluded to (as having acted against the previous order of the Council) was not myself, and that I had acted throughout in strict conformity to rule. If this demand be not complied with, I cannot, in honour, remain any longer a member of the Geological Society; for their books will contain a statement which is greatly to my discredit, and at the same time not true. When the discussion took place at the reading of this paper those who spoke were all against me. But who were they? Men who were already booked and committed to the other side – who had taken a position, and must fight for it – and who had taken their position under a positive mistake as to my own previous paper, in which (misled by Warburton's audacious blunder) they supposed that I had abandoned my old nomenclature. They also spoke, while still in ignorance of their own blunder about the so called Caradoc; wherein lay the whole pith of the question. But less this at present pass. What followed? You, my dear Murchison, made a grievous mistake of judgement in sending (before my abstract was out) your own abstract of the evening's work along with Forbes paltry squib. No man (gout or no gout) likes to be treated as a fool and made an

object of scoff to the groundlings. Lastly in my paper of last year I ended with a good rub at the logic of the Survey, but in perfectly courteous language. I thought the Council would object to the passage which was at the end of the paper. They did object, and I struck it out, and there was no reason (that I know of) why my short paper should not have appeared in the first number of the Quarterly Journal that came out after it was read (3 November 1852). But it was put off than, and again put off, and at length it appeared this autumn, after two papers by the Survey, in which the exact views of McCoy and myself were at length adopted. When my paper was read, it was nibbled at by Forbes, and directly attacked by Salter. This delay was, I think, a needless insult upon me; and a stupid insult, because the dates, after all tell the true tale to anyone who reads them...."

Leaving aside his clear irritation and objection to the events of previous years, it is intriguing to find within Sedgwick's writings an apparent precursor (by some 30 years) to Lapworth's subsequent solution to the Cambrian / Silurian controversy, with the potential for an unconformity bounded sequence (the "yellow" strata on the maps) being discussed. Once the palaeontological error of the inclusion of both Caradoc (*sensu lato*) and Wenlock (*s.l.*) fauna in a single unit was dealt with, a tri-partite division with Cambrian and Silurian respectively, below, and above an intervening "Middle Silurian" or what Lapworth ascribed to the "Ordovician" is a possible construct. His reference to unconformity bounded sequences is also seemingly prescient of modern sequence stratigraphic methods.

This is the second of three extracts from this letter which will be completed in the next newsletter.

Reference:

Clark JW and Hughes TM, (1890), *The Life and Letters of the Reverend Adam Sedgwick, Volume II.* Cambridge University Press.

KHN

Discussion:

Llyn Peninsula "Granites"

Keith Nicholls writes:

In the last newsletter Julian Bridges indicated some (not inconsiderable) uncertainty with respect to the nature of the formal petrological description of the rocks that make up the Gyrn Ddu "Granite" intrusion

A brief review of published articles relating to the family of "Nefyn Group" intrusions suggests that this uncertainty is somewhat systemic in the literature. The intrusions run in a line along much of the north coast of the Llyn Peninsula, forming distinctive rounded hills of Bwlch Mawr, Gyrn ddu and Gyrn Goch, Yr Eifl / Garnfor / Caer Gribin, Mynydd Carnguwch, Moel Gwynus and Garn Boduan.

Evans (1984) reported Rubidium / Strontium whole rock data that indicated an Upper Cambrian / Lower Ordovician age for the Garnfor intrusion (approximately 3km south west of the Gyrn Ddu body), which is described as a "granodiorite porphyry". The same

“granitic” intrusion has been described as being a “*fine to medium grey granite (microgranodiorite)*” at <http://www.buildingconservation.com/articles/rockofages/rockofages.htm>.

Howells (2007) records the Caer Gribin intrusion to be a “*granophyre*” whilst recoding the Yr Eifl body to be a “*microgranodiorite*”.

Somewhat contrasting interpretations by Croudace (1982) and Tremlett (1962) suggest that the intrusions may be either Caradoc (ie Upper Ordovician (coeval with much of the Snowdonia volcanism), or late Silurian / Devonian in age. This latter assertion is repeated in the GA field guide (Cattermole & Romana, 1981) which indicates that the intrusions are “*Caledonian*” in origin. Jonathan Wilkins has indicated (pers comm.) that some confusion may well have arisen with respect to radiometric dating as a consequence of the metamorphic overprinting which occurred during the Caledonian Orogeny. Cattermole & Romano describe the Nefyn intrusion as a “*porphyritic granodiorite*” and the Garnfor / Yr Eifl body as including “*hypersthene bearing granodiorite porphyry*” and grey or pink “*granodiorite*”.

Brinley Roberts’ Field Guide (Roberts, 1979) records the rock types to include: “*tonalite, grano-diorite, granite and soda-granite....commonly porphyritic with a granophyric, medium-grained matrix*”.

With respect to the age issue Roberts notes that “*Some..[were]...emplaced prior to the main period of folding*” but also restates Tremlett’s observation that

others were apparently “*emplaced after the main period of Caledonian Folding*”.

The BGS Geology Viewer lists the intrusions as being unnamed “felsic” rocks of Ordovician / Silurian age, following the description given on the map accompanying the recent All Wales Regional Guide (Howells, 2007).

Reference to the map published with the GA field guide clearly indicates that something is awry with regard to Evans Upper Cambrian / Lower Ordovician dating, since the majority of the intrusions are clearly intruded into Llanvirn age rocks and must therefore post date these sediments.

All in all, it would appear that there is enough of interest in these rocks to keep the NWGA in field trip itineraries for a number of years ahead.

References:

Cattermole, P.J. & Romano, M, (1981), *Llyn Peninsula*, Geologist’s Association Guide, No 39.

Croudace, I.W., (1982), *The geochemistry and petro-genesis of the Lower Palaeozoic granitoids of the Llyn Peninsula, North Wales*, *Geochemica Cosmochemica Acta*, Vol 46.

Evans, J., (1984), *Preliminary Rb/Sr whole rock results from the Garnfor intrusion on the Llyn Peninsula, North Wales*, Rep. Br. Geol. Surv., Vol 16 No10.

Howells, M., (2007), *Wales*, British Geological Survey, HMSO

Roberts, B. (1979), *Geology of Snowdonia and Llyn: Outline and Field Guide*, Adam Hilger Ltd, Bristol.

Tremlett, W.E., (1962), *The geology of the Nefyn-Llanaelhaiarn area of North Wales*, Liverpool and Manchester Geol. Journ., Vol 3, Part 1.

Reports:

GeoScience Wales: Cluster Meeting

The latest GSW Cluster Meeting was by necessity arranged at shorter notice than is usual. Nevertheless, the lecture space at the Royal Cambrian Academy was well stocked with attendees keen to hear about the ongoing preliminary reconnaissance work off the eastern coast of Greenland. Menno Dinkelman presented the results of his team's work in carrying out, modelling and interpreting a substantial seismic survey, in three phases of work in recent years.

He described the significant logistical challenges associated with work in this region, including poor weather, strong currents, ice and a limited window of opportunity to work (between August and October each year). In addition he noted the substantial technical challenge of interpreting the data without proper geological control provided by well bores. The whole area of survey, which compares well with a basin the size of the North Sea, has only a single ODP bore, and the coastal outcrop, available for physical control. Interpretation of the major reflectors has to rely on extrapolation from signatures elsewhere in the world, coupled with detailed iterative review.

Menno outlined a philosophy for his geological interpretation which could offer a useful methodology for all sorts of investigatory work, not just within geophysical interpretation, but throughout the scientific assessment of geological phenomena:

1. Know the regional background
2. Honour all data
3. Compose the model
4. Honour the model
5. Use experience and imagination
6. Question everything
7. Admit Ignorance

The need to avoid being driven by the modelling was explicitly stated.

The outcome of these studies have been to confirm major hydrocarbon prospects in the Thetis Basin, with obvious structural and diapiric hydrocarbon traps apparent on the sections. However some caution was urged with respect to USGS estimates of a reserve of 30 billion barrels, as the opinion that "*prospectivity gets complicated*" was repeatedly stressed.

The only minor quibble I would raise, and this is common it would seem to all talks on geophysical (particularly seismic) interpretation, is that I would much prefer to see some before and after – raw data shots – without the interpreted seismic reflectors – I would like to be able to judge for myself without the thick bright lines of the specialist added. The talk was given in a warm and conversational manner, was very well illustrated, and was warmly received by the audience.

KHN

Liverpool Geological Society
Presidential Address by Dr
Graham Sherwood (LJMU)
9th October 2012
"Perambulations in Peru"

Dr Sherwood presented an insight into the igneous petrology, structural geology, tectonics and volcanism of the Andean Range in Peru. Despite many of the slides being taken from moving buses or trains he was able to offer an intriguing insight into a remarkable landscape.

The geology of the oblique subduction that is ongoing between the Pacific and South American plates was strangely reminiscent of Anglesey, the Lleyn Peninsula and Snowdonia, with granite intrusions, rhyolitic volcanic tuffs and metal mineralisation to the fore. The big difference between the two regions of course, is that the tectonics of the Andean range is very much current and alive, with earthquake and volcanic hazards, a real problem for the both the authorities and the Peruvian people.

A geological background to the usual Peruvian tourist descriptions, and to see some of the country between Lake Titicaca and Machu Piccu, was both welcome and rewarding. At the end of his address Dr Sherwood answered a wide range of questions from the audience of about 40 or so, covering aspects of travel logistics, politics and archaeology.

KHN

**RECENT PUBLICATIONS
RELATING TO THE GEOLOGY OF
WALES AND THE BORDERS**

Wood, M., *The historical development of the term "Melange" and its relevance to the Precambrian geology of Anglesey and the Lleyn Peninsula in Wales, U.K.*, Journal of Geography, Vol 121 (2012). (Published in Japan, probably best sourced as an offprint direct from Margaret Wood at Geomon.)

Morris J, Wright V, Edwards D. *Siluro-Devonian landscapes of southern Britain: the stability and nature of early vascular plant habitats*, Journal of the Geological Society. 169. 173-190 (2012).

Cleal, C. J. *Capel Horeb Quarry - the oldest vascular tissue evidence in the world*. Natur Cymru, 42, 43. (2012)

Dates for your Diary:

**NWGA
Winter Events**

Annual General Meeting

January 26th (Saturday)

Venue: "Canolfan yr Hen Felin",
Abergwyngregyn

10AM– talk to follow the AGM by
Katrien Van Landeghem (School of
Ocean Science, Bangor University). On
"Irish Sea Glacial Landforms" (the talk
is likely to start at about 11:30AM)

**OTHER ORGANISATIONS'
EVENTS**

GeoMon

Wednesday 14th November
"Llanddwyn Island"
11:45AM for 12 Noon Start at
Newborough Beach Car Park
4.5mile walk – no dogs, no hammering

Wednesday 12th December
"Llanddwyn Island"
10:15AM for 10:30AM Start at
Newborough Beach Car Park
4.5mile walk – no dogs, no hammering

Contact for both above meetings:
Paul Gasson 07875 274592

Please note that some of the GeoMon meetings carry a small fee, others require payment of a car park charge. Some of the walks are lengthy, and in some cases traverse difficult terrain. Further details are available in a downloadable pdf file at:
<http://www.geomon.co.uk/>

Geomon's web e-contact details are available at:
<http://www.geomon.co.uk/#/contact/4533286691>

Alternatively you can write to The Old Watch House, Porth Amlwch, Angelsey or telephone 01248 810287.

GSoL (North West region)

Thursday 6th December 2012 - *Ground Gas Mitigation*. Steve Wilson, Birchwood, Warrington

Liverpool Geological Society

Thursday 22nd November, 2012, 7:00PM

"Earthquakes, volcanoes and God"

Rev David Chester, John Moores University, Byrom Street Campus, Liverpool

Tuesday 22nd January, 2013, 7:00PM

"More gap than record"

Joe Crossley, John Moores University, Byrom Street Campus, Liverpool

Manchester Geology Association

Saturday 12 January, 2013

The Broadhurst Lectures: The Palaeontology of China

"Doushantuo Microfossils: the oldest animals in the fossil record?" - Dr John Cunningham, University of Bristol
"The Cambrian Fossils of Chengjiang, China: the flowering of early animal life" - Professor David Siveter, University of Leicester

Jurassic spiders from China - Professor Paul Selden, University of Kansas
"Exceptional Preservation of Dinosaur Eggs and Embryos from the Upper Cretaceous of Henan Province", - Dr John Nudds, University of Manchester

Shaking the tree of life by the roots: a bottom-up perspective on the Palaeozoic and Mesozoic fossil plants of China - Dr Jason Hilton, University of Birmingham

Pterosaurs from the People's Republic of China - Another great leap forward? - Dr David Unwin, University of Leicester

Booking is essential for the Broadhurst Lecture Series.

Contacts for all MGA Meetings – Jane Michael through:

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

St Bedes College (Alexandra Park, Manchester)

Wednesday 28th November, 2012, 7:30PM

Christmas Lecture 'Living with earthquakes and Tsunamis' There is no limit on the number of tickets (at present) and no charge for the evening although a donation to the "School under the Tree" project in Ethiopia would be welcome on the night. If you are interested please contact the College to express your interest and allow them to assess numbers - <http://www.stbedescollege.co.uk/news/2012/10/christmas-geology-lecture>.

National Environment Research Council (NERC)

20 November 2012

Manchester Conference Centre, Weston Building, Sackville Street, Manchester
NERC would like to invite the environmental science community and its stakeholders to participate in a community event. This event will allow you to influence NERC's strategic direction and research priorities from 2013 onwards. The day will be split into two parts; the morning session will focus on developing NERC's new strategy and provide participants with an opportunity to discuss it with NERC's Chief Executive and Directors. The afternoon session will be focused on NERC's strategic research priorities. It will provide participants with an opportunity to engage Theme Leaders and NERC staff in discussions about emerging theme action plans. The event will be open for registration from 10:00. The morning session will commence at 11:00 with a plenary session, followed by lunch at 12:30. In the afternoon each theme session will be run twice and,

therefore, it is possible for participants to attend discussions on two different themes. An agenda for this event is available at <http://www.nerc.ac.uk/events/121120/> Advance booking is strongly recommended.

Quaternary Research Association

17th -20th April 2012

Field trip: "*The Quaternary of the Monadhliath Mountains and Great Glen*"

Deadline for registration 10th January 2013

More details at:

www.qra.org.uk

St Asaph Archaeological Society

Wednesday 6th February 2013, 7:30PM

"The Picts"

Philip Holdsworth, Cricket Club Pavilion St Asaph

Wednesday 6th March 2013, 7:30PM

"Ffynnon Beuno Cave Dig – Neanderthal Period Finds"

Rob Dinnis, Cricket Club Pavilion St Asaph

Wednesday 1st May 2013, 7:30PM

"Archaeology of Liverpool Docks"

Sarah Pevely, Cricket Club Pavilion St Asaph

Saturday 4th May 2013, 9:00AM

Field Visit

"Industrial Archaeology at Gwydyr Forest"

If you are interested in attending any event please contact

Secretary – Maria Blagojevic, 07767705100;

maria@stasapharchaeologysociety.org.uk or Mblag@gotadsl.co.uk

**National Association of Mining
History Organisations**

(NAMHO)

28 June to 1 July 2013

*Conference: Mining Legacies - the
environmental, physical and cultural
impact of mining*

Venue: University of Aberystwyth

Web News:

NWGA

Our Facebook page is slowly attracting a select band of followers. Please take a little time to visit and “join” at:

<http://www.facebook.com/groups/northwalesga/>

The Linked-in page appears to have withered on the vine however, and will no longer be updated.

The Institution of Civil Engineers have published on line a number of lectures relating to broad geological and geotechnical issues. These can be accessed at:

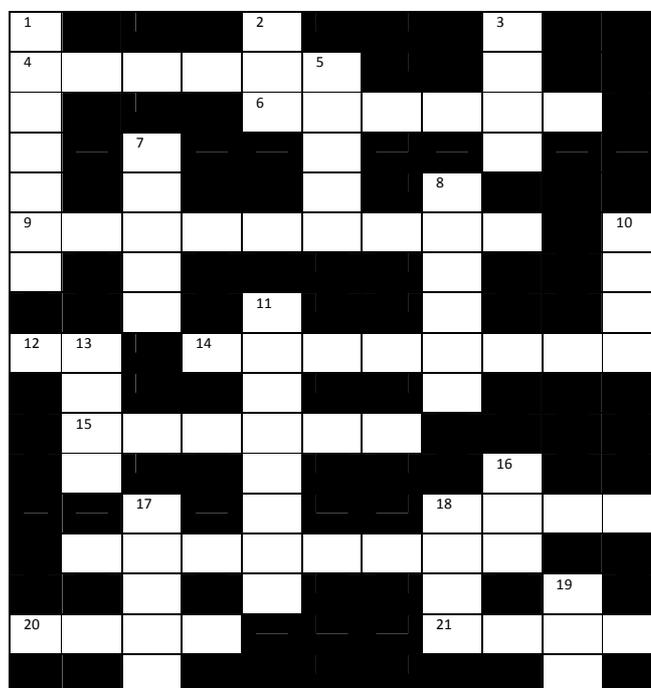
<http://www.ice.org.uk/topics/groundengineering/Recorded-lectures>

At the time of writing lectures on Cliff Recession, Earthquake Design in the UK and Geo-Energy Engineering are available.

Finally a reminder of the NWGA Web site itself at: www.ampyx.org.uk

The web site has been updated recently with all except the very recent editions of the Newsletter now available for direct download.

Christmas Crossword



Across

- 4 Optical quality: associated with amongst other things a Chinese river and a North American National Park
- 6 Surname of hat wearing American academic well known for work with dinosaurs
- 9 Southern State: home of the Scopes trial
- 12 "Way ...": Key to understanding sedimentary sequences – get this wrong and it's all the wrong way round
- 14 Characteristic Lower Palaeozoic brachiopod with straight hinge line
- 15 English border town that boasts its very own Research Group
- 18 New Red Russian city
- 20 Originally flat lying intrusive body, bounded top and bottom by country rock

- 21 Antiquated term for igneous rocks such as basalt

Down

- 1 Indicator mineral characteristic of a particular grade of regional metamorphism
- 2 Abbreviated Christian name of 6 Across
- 3 Base member of a phylogeny, or a type of cell with growing medical potential
- 5 Here we find ourselves – Cambria by any other name
- 7Doyle – mixed up men and dinosaurs on a South American Plateau. More recently associated with fantastic destruction
- 8 If it wasn't an impact that saw off the dinosaurs, these traps would have had a say
- 10 Alpine range of mountains – give rise to a third of the Mesozoic
- 11de Chardin, somewhat impenetrable priest, come philosopher, come palaeontologist, come anthropologist
- 13 Deep foundation – often used to get down to bedrock
- 16 Fundamental unit of sedimentary sequences
- 17 Gas, saviour of the piston engine society perhaps? or not?
- 18 Indicative of “later than”
- 19 Heavy end hydrocarbon – made a sticky mess of many Californian mammals

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Front cover image:

Glaciated U shaped valley and flanking hanging valleys. Tanat Valley - view south eastwards; towards Llangynog; evening sunlight casts a shadow from Craig Boeth.

Notice is hereby given of the Annual General Meeting of the Association

January 26th (Saturday) 2013: 10:00AM

Canolfan yr Hen Felin, Abergwyngregyn

AGENDA

Apologies for Absence

Minutes of the previous AGM (Saturday January 21st 2012)

Chairman's Report (& Membership)

Treasurer's Report

Elections for the posts of:

Chairman: (incumbent Jonathan Wilkins)

Treasurer: (incumbent Frank Buxton)

Secretary: (incumbent Judith Jenkins)

Meetings Secretary: (incumbent Cathy O'Brien)

Newsletter Editor: (incumbent Keith Nicholls)

Ordinary Committee Members: (All Positions vacant)

Any Other Business

All the existing committee members have indicated their willingness to remain in post for the year ahead. Please note that we are keen to receive any nominations or offers of assistance for any committee post, so please contact the Secretary if you are interested, or if you have any other item for consideration. Nominations for all posts will be accepted at the AGM, and if necessary elections will be made by show of hands.

AGM at 10:00AM – followed by refreshments and a talk by Katrien Van Landeghem (School of Ocean Science, Bangor University). On “*Irish Sea Glacial Landforms*” (the talk is expected to start at 11:30AM).

Non members are welcome – but unable to take an active role in the formal AGM.