



Cymdeithas Daeareg Gogledd Cymru
North Wales Geology Association

NEWSLETTER

Issue 77

May 2013

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Front Cover Image:

A thin section in plane-polarised light of a pegmatitic vein within the microdiorite of the Penmaenmawr intrusion. This shows an excellent micrographic (or granophyric) texture that is thought to arise from the simultaneous crystallisation of alkali feldspar and quartz at relatively low temperatures in a volatile rich environment. A defining feature is that alkali feldspar is also present as large, euhedral crystals from the corners of which the intergrowths appear to radiate. Normally, the intergrowth is obscure in plane-polarised light, but in this case the feldspar crystals are pseudomorphs converted to a mosaic of pumpellyite and epidote which makes them dark in contrast with the transparent quartz which has not been affected. This retrograde metamorphism is attributed to the Caledonian Orogeny, whose thermal imprint has also reset Rb/Sr radiometric dates to give anomalously low age determinations.

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Chairman's Message

Well, the sand has finally settled in Colwyn Bay, and the view from Rhos Promenade is strange, because a bright, sandy beach can now be seen by the distant pier and Porth Eirias, which will be launched in a great Prom Xtra jamboree later in May. The dredger barge Barent Zanen is hard at work off the Wadden Islands (NL) as I type. Keith reckons that the new sand will all be gone in a year or two - so we wait and see who is right, and how soon other, sand-starved resorts have to wait for a quick re-charge. (see reference to the new publication by Oliviera et al listed elsewhere in this issue)



Quite apart from my responsibilities to our own Association, I am often asked if I will lead trips for other, visiting groups (on one recent occasion with just three days' notice, when I had to decline because I do still go to work). Accordingly, I tramp around checking an itinerary and outcrops, and do some reading to bone-up on a few technical points ready to answer the inevitable questions. A recent outing took me to Rhoscolyn and Trearddur Bay for a day's revision, and I was very fortunate in enjoying sunshine for the whole day. When I reached home I was exhausted, wind-blown and elated - having enjoyed an exceptionally fine day's geologising - and really impressed by the range, scale and quality of the exposure on display. Truly, we are blessed to live in an area with so many brilliant rocks on display, and I am sure that is

part of the reason why the interpretation of them has generated so much controversy in the past. Anglesey is fertile ground for field meetings, which is why we have visited often from the NWGA, but also why we try hard to offer an alternative in our current programme.

Much discussion was sparked by our recent lecture from Professor Plater from Liverpool University, and a certain amount of disappointment that it was not more widely promoted locally. I have mentioned in the past the 'cluster' meetings of Geoscience Wales, and you will have read reviews of their content by various authors. Geoscience Wales Ltd. is a not-for-profit company that acts for its subscribing members as a promotional vehicle that explores commercial opportunities to be farmed-out to individuals and groups with combined skills. Not all its members are geologists, they also include IT specialists, map-makers, marine scientists etc. The possibility of collaboration with GSW within our meetings programme will bring a wider range of contacts than is enjoyed by the NWGA committee together with a wider potential audience for our meetings. We will keep you posted regarding future developments, and while NWGA members are welcome at GSW cluster meetings there are currently none in the offing as their regular season has ended.

Our own field season will start soon, so please sign up with Cathy (or individually nominated contact) for full joining details to enjoy the special offerings that North Wales provides so abundantly.

Jonathan Wilkins

Articles:

A letter from Sedgwick (iv)

Having briefly moved away from the Cambrian / Silurian controversy with the last extract from Sedgwick's letters, we now return to that rich source of historical context. In previous letters we have seen how Sedgwick, in collaboration with McCoy, had discerned two distinct fauna within what the Survey geologists, working under Murchison, had ascribed to the Silurian (*sensu* Murchison) Caradoc Sandstone. In the summer of 1854 McCoy and Sedgwick returned to Wales and its borders, in final preparation for a meeting of the British Association to be held in Liverpool during the following autumn.

In preparation for that meeting Sedgwick wrote as follows:

“The task undertaken by Professor McCoy and myself in 1853 was left incomplete; but we have this autumn taken it where it had been abandoned, and completed our examination of various critical sections at the junction of the Cambrian and Silurian rocks which we had not been able to visit during the preceding year. Is there in South Wales any Middle Silurian group in which the characteristic Silurian and Cambrian types are so mixed and confounded as to be inseparable? In North Wales and Siluria we found no such group.

Wherever it had been erroneously laid down as one group we found it separable into distinct stages – the upper of which contained a characteristic Silurian group of fossils – and the lower an equally characteristic Cambrian group. But I was informed that near Builth, in some of the eastern Hills of Radnorshire, the Government Surveyors had found the very mixture of older and newer types which we had sought for in vain in our short excursions in 1852 and 1853. To the places this indicated, taking the Presteign sections on our way, we first bent our steps, and the results of our

examination will be given in the early part of this communication. They are in perfect agreement with what we had before seen in North Wales and Siluria. There is we believe no Middle Silurian Group like that laid down in the Government Survey; there is no confusion of organic types; the May Hill group, though in a degenerate and disconnected form, does exist in the country here alluded to, as a distinct formation – separable from the so-called Lower Silurian rocks, and constituting a physical and palaeontological base to the true Silurian System; and lastly that System, when reduced to its true base, is we believe, either in actual position, or in palaeontological succession, discordant to the Cambrian rocks on which it rests.

If these conclusions be true, there is an end of any legitimate dispute on nomenclature; for we have no example in English (sic) geology of two great formations which are as a general rule, unconformable in their position, yet at the same time belong to a common series, and pass under a common name.

Having thus completed our observations of the groups connected with the May Hill Sandstone, we next examined the sections through the Llandeilo group in the valley of the Towy”



Large pentamerid brachiopod exposed in masonry wall adjacent to the Bala – Dolgellau road about 1 mile west of Bala - 5p coin for scale (Image – KHN)

Sedgwick and McCoy were now establishing that what had previously been mapped as an all-encompassing Silurian “Caradoc Sandstone” should in fact be ascribed to a Cambrian (*sensu* Sedgwick) Caradoc Sandstone and an overlying “True” Silurian “May Hill Sandstone”. The Caradoc Sandstone was characterised by the presence of fauna such as the trinucleid trilobites and the distinctive orthid brachiopod *Orthis flabellum* whereas the overlying May Hill Sandstone was characterised by the brachiopod genera *Pentamerus* and *Stricklandia*.

Subsequent work by the Survey geologists does appear to accept Sedgwick’s arguments, and the base of what we now define as the Silurian does approximate to the chronological and lithological division between the “*Bala Beds*” and what subsequently became known as the “*Llandovery*” succession.

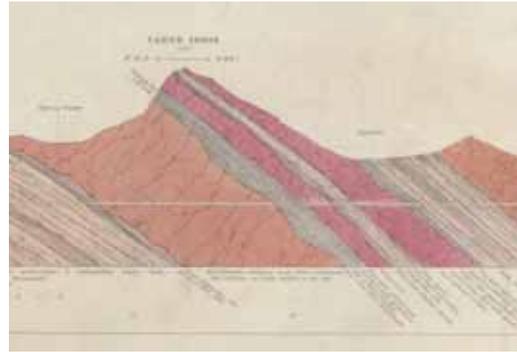
Reference:

Clark, J.W., and Hughes T.M., (1890) “*The life and letters of the Reverend Adam Sedgwick*” Cambridge University Press.

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Old Geological Maps and Sections

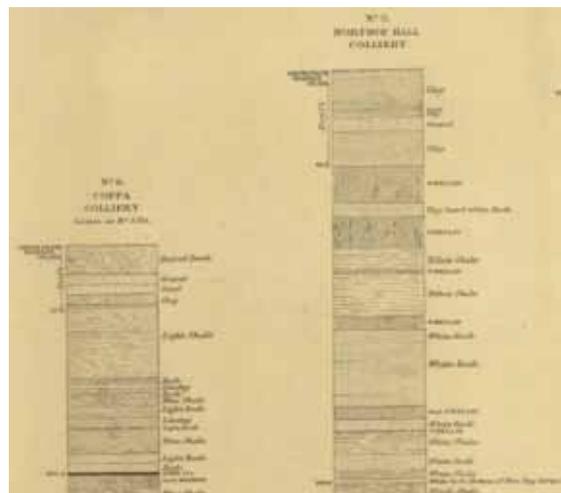
At the base of this brief article there is a web link to the newly established BGS portal allowing viewing of old 1" and 6" BGS geology maps for the UK and Ireland produced between 1835 and 1905. These are now available for free viewing on their website, but please note that copyright on them is still in effect for commercial use.



Both images: Copyright British Geological Survey: NERC 2013: Stratigraphic section through Cadair Idris

The detailed geology is often outdated or has been updated and/or superseded by more recent maps. However, the base maps they use often predate the first official O.S. maps. Generally O.S. maps only really start properly in most areas around the 1870's or 1880's - or for selected urban areas sometimes the 1850's to 1870's at 1:500 scale. As such the smaller scale base maps hiding underneath all the pretty colours can extend over time periods and geographical areas not usually covered by the O.S. map sets available from the likes of Landmark or GroundSure packs. In areas active, for example in mining prior to 1870 this can be very informative

<http://www.bgs.ac.uk/data/historicalMaps/home.html>



Chris Swainston

Discussion:

Dry Stone Walls

Colin Humphrey writes:

The article on dry stone walling (in Issue 75) recalls a visit to the Millennium Wall, built in 2000 at the National Stone Centre, Wirksworth, Derbyshire, by members of the Dry Stone Walling Association. Eighteen different groups each brought along a lorry with 10 tonnes of their own native stone to build a six-metre length in their own regional style! The variation is remarkable, from Lego-neat walls of perfectly jointed sandstone blocks, to a wall you can see through, composed of large rounded boulders which look as though they cannot hold together but somehow do. Worth a visit if you are passing, and there are other things to see at the Centre.



Image from the National Stone Centre web site:

http://www.nationalstonecentre.org.uk/vs_millenniumwall.html

Errata:

In the April Issue of the Newsletter Sheffield University's Fergus Gibb was incorrectly listed as giving talks on both the End Permian Mass Extinction and Nuclear Waste Disposal. Confirmation that the talk on the End Permian event was given by Paul Wignall of Leeds University.

Apologies to anyone who is still struggling with the unnumbered, and quite literally clueless, void in the Christmas Issue

crossword. The absent clue is "There's a type of dinosaur". Anyone who managed to solve the crossword without the errant clue gets to set next year's puzzle!

Abstracts:

May 22nd 2013 *"Manx – Mon musings – beguiling similarity in geological style"*

Dr Bill Fitches



The Isle of Man comprises mainly Ordovician and Silurian sedimentary rocks and lies 'Within Sight of the Iapetus Suture'. These rocks, mostly turbidites, are low-grade metamorphosed and strongly deformed, though when exactly is not known. Just across the sea is the Monian assemblage of Anglesey and Lley. Some of the Monian sedimentary rocks resemble those of the Isle of Man, also have Lower Palaeozoic ages, and their metamorphic-tectonic features are comparable in part. How these close neighbours might fit together, however, is likely to provide a source of fun for the speculator.

On the NW coast of the Isle of Man are the Peel Sandstones, dated as Early Devonian, red-beds comprising alluvial sandstone and conglomerate, calcrete and lake beds, which were deposited on the previously deformed and metamorphosed Lower Palaeozoic rocks. The red-beds are themselves deformed by thrusts and folds that were once regarded as slump structures but were re-interpreted recently as tectonic by Fitches (2011). They

match sporadic, late structures in the Lower Palaeozoic rocks and appear to be Acadian in age. Across the water on Anglesey are the analagous red-beds of Lligwy Bay. They are also folded and cut by thrusts of likely Acadian origin. The Manx-Môn match appears to be close in the Early and Middle Devonian.

On the south coast of the Isle of Man are outcrops of Carboniferous limestone, which contain a wide array of warm-water fossils including coral, bivalves and crinoids. Although mostly flat-lying and apparently structurally bland, the limestones too have their tectonic moments. Open folds, once attributed to draping over carbonate mounds, and associated cleavage show that the Isle of Man is situated in the British Variscan foreland. Closely comparable are limestones on Anglesey and the North Wales coast, all part of a shallow marine platform that occupied this region. Similar Variscan structures, but bigger, probably include those in the Orme. In the Isle of Man, prolific mini-structures in the Carboniferous limestones are an untapped source of information about the Mesozoic and Tertiary tectonics of the Irish Sea. Very likely, they are also common in North Wales. Collectively they could give the oil industry and academia much information about the offshore basins.

June 9th 2013 – “Field Visit to Cadair Idris”

Led by Graham Hall, Coleg Merion Dwyfor,
Based on the Cregennan Lakes and the mountain ridge of Pared y Cefn Hir

An itinerary displaying a variety of igneous intrusions, lavas and pyroclastic rocks associated with the Cadair Idris volcanic centre.

Particularly interesting features are:

The microgranite magma chamber with a spectacular xenolithic margin

Fining-upwards sequences of pyroclastics, representing a sequence of rhyolitic eruptions

Coarse beds of volcanic debris thought to be lahar flows

Basalt lavas containing specular haematite, once mined on a small scale as iron ore

Mudstones interbedded with the volcanics which contain fairly abundant graptolites and occasional trilobites.

We would follow a circular route, climbing to the ridge of Pared y Cefn Hir, then returning across lower ground. The mountain walking to see the most interesting outcrops is quite rough and steep in places - so the itinerary can be varied if necessary to keep to well-marked footpaths.

July 7th 2013 – “Field Visit to Penarth Mine, Corwen and neighbourhood”

Led by Keith Nicholls

Follow public footpath to Penarth Slate Mine – view Early Silurian sediments – Llandovery and Wenlock slates and shales. Graptolite collecting possible. Opportunity for those with appropriate skill set, insurance and equipment to venture underground.

12:30 – 1PM return to vehicles. Lunch opportunities available at Carrog Railway Station (café) and Grouse Hotel (Pub) as well as river side picnic for those who bring their own.

Nant y Pandy (RIGS site). Designated as a consequence of the exposures of glacial till, and the geomorphology of the valley. The site also has extensive remains associated with former slate works, dressing floors etc

Sturdy footwear essential, hard hat advisable for Penarth Mine (compulsory for anyone entering the below ground workings). Both sites are within about 500m of the A5. Nant y Pandy is a reasonably gentle climb – Penarth Slate Mine a little more physical.

For both trips please contact Cathy O'Brien to register your interest and receive full joining instructions.

Reports:

North Wales Geology Association

Professor Andy Plater, Pensychnant, April 24th 2013

“Particle size evidence of recent coastal change”

A particularly curious and convivial group of members and guests gathered to enjoy the real fire downstairs, the newly refurbished radiators upstairs and a fascinating talk by Professor Andrew Plater from the School of Environmental Sciences at Liverpool University. He presented work undertaken by himself and colleagues Dave Clarke, Hayley Mills, Joe Brennan, Weiguo Zhang, Rubina Rahman, James Walker and Samantha Godfrey.

The eighteenth and nineteenth century silting up of the Dee Estuary provides a local example of just how dynamic estuaries can be, with what were “Welsh” mudflats migrating over a few decades to become “English” mudflats, along the front of Parkgate, Little Neston, Shotwick etc. Observations of mm scale laminae in the sediments had revealed a correlation between the grain size sorting, and the tidal cycles, with well sorted sediments reflecting relatively high energy flood and ebb tides, but with slack water associated with less well sorted drapes.



These observations had led to the hypothesis that sea-level reconstructions could be established from detailed analysis of the coastal sediment grain size distributions. Concerns however are apparent, relating to the possible influence of creeks within the tidal flat. In order to test the hypothesis an estuary without this potential obfuscation was required. Consequently the research had shifted to the Yangtze Estuary, which is much less dissected.



To cut a complex statistical argument rather short, Andy demonstrated convincingly that the principles established in the Dee seemed to hold for the general case, as represented by the Yangtze sediments.

So far so good then – but what about the practical applications of these methods? Andy had returned from California only the previous week, where he is involved with a study of the Pescadero Marsh, a highly seasonal estuary south of San Francisco. The estuary is a back barrier system, with only limited connectivity to the sea. This is a crucial element of the ecology however, controlling the spawning potential of the Steelhead Salmon, a much sought after sport fish.



Identification of high energy events using the techniques established in the Dee and Mersey were illustrating the historical behaviour of the estuarine

system, and were allowing authorities to plan appropriate interventions to maintain the ecology.

As is becoming customary at our meetings there was a vibrant Q & A session, with the group fascinated it would appear by the prospect of wider application in sediments, and in particular by extension further back into the rock record. The Q & As had to be cut short to allow the group to retire to the drawing room, and allow our speaker a well-deserved warm drink, and journey home.

University of Chester: Public Lecture

Professor Bruce Ing, Beswick Lecture Theatre 11th April 2013

“The magic of slime moulds”

So what are slime moulds? Animal? Plant ? or Fungus? If you answered *“None of the above”* then you are perhaps on the way to understanding these bizarre life forms. Modern classification techniques have allowed us to recognise them as most closely related to protists. Two key facts to remember about slime moulds – they are neither slimy, nor moulds! They do not have a role as promoters of decomposition in the manner of fungi, nor are they parasites. They are actually scavengers, and are present in prodigious quantities in typical soils. Slime moulds have quite remarkable life cycles, including the growing of plasmodia which are multi-nuclear single cells.

Professor Ing raised a key point which is relevant to many branches of science, particularly perhaps to those working in palaeontology, when he noted that apparent rarity is often a function of the lack of active searching. Indeed things may come to appear rare, if you are failing to look in the right place, or at the right time.

Of course all come away from such an authoritative lecture having learnt something, but personally I have a new favourite word, to be saved perhaps for addressing journalists of a particular type – *“fimicolous”* – dung dwelling!

Potential uses for these remarkable “creatures” include uses as antibiotics – bacteria and viruses cannot become immune to being eaten. They have potential in engineering – it is possible they might be able to remove iron bacteria in water supply pipes for example. Perhaps some of the more “blue-sky” thinking suggests that their plasmodial streaming might have computational uses.

The vote of thanks was offered by our own Professor Cynthia Burek and was afforded the usual warm acclamation from the group of about 40 or so in the lecture theatre.

For a brief introduction to this curious subject matter - from the UK’s leading expert in the field – filmed on our patch at Loggerheads Country Park - check out:

<http://www.youtube.com/watch?v=k17zHT9k-DQ>

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Geoscience Wales: Cluster Meeting

Jenny Huggett of Petroclays, Royal Cambrian Academy (Conwy), 18th April 2013

“Green Clays: Uses and Pitfalls”

The GSW meetings are always well worth attending – and this talk was both thoughtfully presented, and thought provoking. Clearly Jenny has complete mastery of her subject, but is also able to present her findings in a manner simple enough for the generalists in the audience to understand.

Back in 1985 I had attended two lectures a week for six weeks on the subject of clay mineralogy – but since then words such as “smectite”, “glaucony” and “verdine” have not been part of my vocabulary – I have forgotten far more than I remember. Nevertheless I found Jenny’s talk fascinating. Not least perhaps because in talking about invertebrate reworking of marine sediments, and crustacean burrows, the subject matter melds into my own studies. But there was much here for us all.

Perhaps the biggest lesson to come out of the talk, and this is in keeping with a number of recent papers and conference proceedings, is the role that organic life has in generating many aspects of the geological record. Bugs and beasties are not passive residents on the earth’s surface, but are active *“terraformers”* – redistributing, altering, and depositing significant amounts of the sedimentary rock record.

Jenny also pointed out an observation that we are probably almost always wrong when referring to clay minerals as montmorillonite, glauconite, smectite etc, as there is unlikely to be any naturally formed mono-mineralic clay – they will all be mixtures of clay minerals in variable proportions.

The conclusion reached at the end of the presentation was that there are significant pitfalls in using green clays as palaeo-environmental indicators, as there are simply too many unknowns, and perhaps some unknowables in the detailed organo-geochemistry that leads to their formation.

More on this topic published as follows:

Huggett, J., (2008) *“Aspects of the evolution of green clay”*, J Min Soc Poland., Vol 33.

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Recent Publications:

Oliveira, F.S.B.F., Freire, P., Sancho, F., Vicente, C.M. and Clímaco, C., (2011). *“Rehabilitation and protection of Colwyn Bay beach: a case study”* Journal of Coastal Research, SI 64 (Proceedings of the 11th International Coastal Symposium), 1272 – 1276. Szczecin, Poland. Available on-line at: http://www.ics2011.pl/artic/SP64_1272-1276_F.S.B.F.Oliveira.pdf

Dates for Your Diary:

NWGA: Evening Lectures

Wednesday 22nd May 2013

“Manx – Mon Musings”

by Dr Bill Fitches (see abstract elsewhere in this Newsletter)

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

Pensychnant, Conwy 7:30PM (committee meeting before hand at 6:15PM – all members welcome to attend). This is the last indoor meeting of this season.

NWGA: Summer Field Visits

Sunday 9th June 2013

“Dolgellau”

Led by Graham Hall – see Abstracts

Sunday 7th July 2013

“Penarth Mine, Corwen”

Led by Keith Nicholls – see Abstracts

NEWRIGS Evening Meetings

July 8th 2013

“Wirral - Trias sandstones Caldy and West Kirby and glacial deposits Thurstaston”.

Meet car park Hawarden for 6.00pm

August 19th 2013

“Waterfall and Llyn Llyncaws - glacial features Llanrhaeadr ym Mochnant off the Oswestry Bala road”. Meeting time 6 or 6.30 in the village TBC.

Sept 9th 2013

“Halkyn Mountain” with AGM in the Blue Bell after.

Joining Instructions contact Ray Humphreys Meetings Convenor:

curlybear100@hotmail.com

Liverpool Geological Society

Saturday 11th May 2013

Field Visit to Dudley (including Wren’s Nest SSSI)

Friday – Sunday 17th / 18th / 19th May 2013

Field week end to Anglesey (led by JW)

Details available from the Society’s web site at: <http://liverpoolgeologicalsociety.org.uk/index.php>

National Association of Mining History Organisations

28 June to 1 July 2013 Venue: University of Aberystwyth

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

Ironbridge Gorge Museum Trust and University of Birmingham

10th to 14th July 2013

Ironbridge Gorge World Heritage Site

Conference: “Rust, Regeneration and Romance: Iron and Steel Landscapes and Culture”

<http://ironandsteel2013.wordpress.com/ures>

International Association of Sedimentologists

University of Manchester:
2nd to 5th September 2013
“30th IAS”

<http://www.sedimentologists.org/meetings/ims>

University of Aberystwyth Centre for Advanced Welsh and Celtic Studies

Friday – Saturday 7th – 8th June 2014.
Second multidisciplinary workshop: “*Thomas Pennant’s Tours*”

Web News:

1. The BGS have released a downloadable interactive 3D model of the Assynt Culmination (thin skin thrust tectonics). Check this out at:

<http://www.bgs.ac.uk/research/ukgeology/assyntCulmination.html>

2. The University of California Digital Library have published on line the remarkable book by Georgius Agricola “*De re metallica*” (1912 translation by Hoover and Hoover). This is available at:

<http://archive.org/details/georgiusagricola00agririch>

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