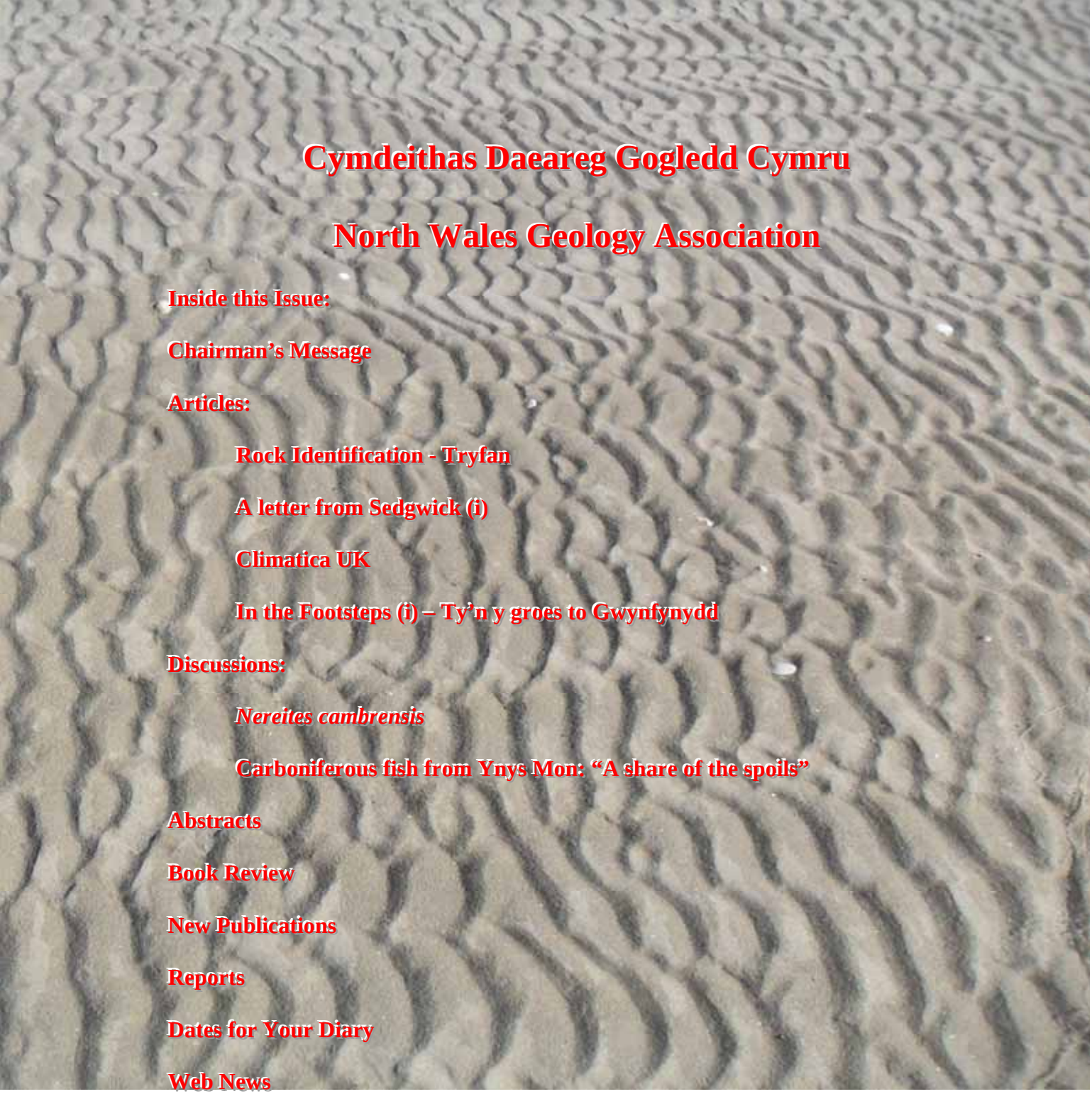


Cymdeithas Daeareg Gogledd Cymru

North Wales Geology Association

Inside this Issue:

Issue No 70 NEWSLETTER June 2012

Chairman's Message:

It is now the field season, and if you have not signed up for any of the events publicised so far, then you should think seriously about it. While there is a great deal of theoretical work done relating to rocks, Geology remains a principally observational pursuit and there is no substitute for getting out and looking at the outcrops. We are fortunate to be able to call upon the expertise of our field leaders, and I can assure you that it is no easy option to put on a field meeting instead of an indoor one. In this edition you will find details of another meeting for later in the season, this time relating more specifically to the Quaternary, surface deposits and landforms relating to the splendid legacy of glaciation and de-glaciation in this key area of the Irish Sea basin.

By coincidence this year I shall be taking my annual holiday in Laurentia, on the Mull of Galloway, the furthest northerly point of the Irish Sea basin, and one which shows to splendid effect a quite astonishing and extensive raised beach platform. There is no better demonstration of the changing height of land and sea during post-glacial times, and while I was surprised and amazed the first time I saw this feature, on this occasion I will be prepared to explore it more fully. I hope that you will also be able to enjoy to the full the geological features of the areas that you choose for your retreat (unless you have less focused leisure time and have already been enjoying outings that I can only dream of). It is a curious feature of the present recession and economic hardship that the World's petroleum producers are working us harder than ever in our laboratory, so I shall be really looking forward to getting away for a bit.

I am no great enthusiast for most of the whizzy technology that we are urged to take up in order to make our lives fuller, richer and more productive no matter when and where it can be applied. Yes, I do have a mobile phone (though it is rarely turned on), but I do not have the benefit of 3G, roaming access or any particular desire to set up my iPad on a hillside and do stuff, whatever it may be. New Scientist covered recently a new and potentially interesting phenomenon, at least where WiFi and Internet access penetrate - Digital Graffiti. The convergence of phone, web browser and high-resolution GPS mean that it is now possible to attach digital 'tags' to buildings, works of art or dodgy restaurants for the delight or information of anybody suitably equipped. I think that spectacles equipped with built in LCD viewers were postulated to enhance the experience, but it suddenly came to me that in future key rock exposures could be invisibly tagged with interpretive information, a discourse on their origin or an ongoing-debate between furious antagonists arguing for or against mantle plumes, meterorites vs supervolcanoes etc. The mind boggles at the possibilities, and so much cheaper and less obtrusive than traditional interpretation boards. Vandal-resistant too, as their activities would become part of the debate rather than its destruction.
Brave New World, indeed.

Jonathan Wilkins

Articles:

Rock Identification - Tryfan

"What is this rock and how is it formed?"

This was the question put to me by a work colleague who had found it. She had been rock climbing on Milestone Buttress on the A5 side of Tryfan, and found this on her descent down a gulley between Castle Rocks and Wrinkled Slabs (at grid ref approx SH662 598).

It was found on the ground but there were also several large blocks of the same material in the area, so it would seem to have fallen from the rock slopes above. If it had fallen off the rock faces above then that would put it as from the Glanrafon group within the Caradoc series of the Ordovician, and the probability of a lot of large blocks of the same type of rock being transported by ice to the same locality seems unlikely, but it could have come from elsewhere in Snowdonia.

The easy bit is descriptive, it is a grey conglomerate of a lot of rounded, oval shaped, flattish grey pebbles, long axis of about 15mm, short axis about 6mm and thickness about 2mm, all aligned in one direction. The pebbles have a slightly polished appearance and are composed of a very fine grey sediment within a slightly coarser grained matrix. A few small quartz grains are visible with hand lens at 20x magnification within the matrix, but the remainder of the matrix seems too fine to recognise any other mineralogical features apart from a few grains of slightly rusty pyrite. It has obviously been subjected to slate grade metamorphism from its shiny appearance and hardness. Overall it gives the appearance of stretched chocolate buttons in a fine grained matrix. The sample is 30mm thick and the distribution of the pebbles does not vary within that thickness at all.

After a lot of examination of it and puzzling over a day or two I concluded that I think its formation might be something to do with a turbidite, the pebbles could be a disrupted layer of fine, partially cemented sediment, caught up in a fast moving submarine event. The pebbles are clearly water worn from their shape, their orientation might be to do with the direction of water movement, but as the rock has been subject to slate grade metamorphism this might also have caused or influenced their oval shape.

However, not being any sort of clastic sediment expert, I am not that confident in my conclusion and would welcome ideas and expertise from others. I have the sample on loan for now, but the finder does want it back! The location of its finding would enable me, and others, to find their own samples as it is only a

short scramble from the A5. Any additional thoughts on possible origins for this rock would be welcome (contributions by email to KHN for collation please).

(C O'B)

A letter from Sedgwick (i)

The work of the Reverend Adam Sedgwick, but more particularly his dispute over the nomenclature of the Lower Palaeozoic rocks in Wales with Murchison, is the stuff of geological legend. Whilst it is clear that Sedgwick was, what would be called by some today, something of a "complicated" individual; we are fortunate to be able to judge for ourselves the nature of the man by his writings.

During a recent chance visit to Hay on Wye a copy (it seems to be a First Edition!) of Clark & Hughes collection "The Life and Letters of the Reverend Adam Sedgwick" was found (unfortunately only Volume II). Evidently, once having been part of the University of Cape Town's library, this book includes a series of documents, commencing in 1840; including letters written to friends, family, correspondents and acquaintances. It is the intention to selectively work through these documents in the coming issues months, and to publish relevant short passages in the Newsletter, that might be of interest to our readership.

The first such document is an extract from Sedgwick's preface to JW Salter's Catalogue which, whilst written shortly before Sedgwick's death, describes his 1842 visit, accompanied by J W Salter, to the Bala area:

"We examined in great detail the two lines of the Bala Limestone caused by synclinal flexure, securing our work by tracing both beds along their strike, and in this way we demonstrated that the more eastern limestone bands in the Llanwddyn valley were identical with the eastern bands that cross the road between Bala and Llangynog. We also carefully mapped a part of the country east and north of the northern Berwyns; and we completed in great detail sections which connected the Silurian rocks south of the Tannat and north of the Ceiriog, showing the emergence of the old Cambrian rocks which pass through the intervening country and form the highest crest of the Berwyns. We also examined the great fault SE of Llanwddyn which produces an entire inversion of the strata through a range of several miles. This fact I had first observed in 1832, and had verified it by following the inverted beds along their strike till they had regained their normal position, and we found that we had no corrections to make in this portion of my old sections of 1832. I mention these facts only to shew how conscientiously our work was done. We sought the truth, and would have embraced it, to whatever conclusions it might lead us.

It should be noted that the rocks that Sedgwick considered to be "Cambrian" in the Berwyns ie everything with macrofauna that lie beneath the "Silurian", are rocks that we now consider to be Ordovician.

In the following year Sedgwick returned to North Wales, and in a letter to his

daughter Isabella, wrote of *"wetting and drying, and soaking, and wringing"*, describing, seemingly with uncanny foresight, a number of NWGA field trips in the area.

In the next Newsletter we will begin to see the seeds of the subsequent dispute with Murchison being sown, and receive a lesson in pronunciation of Welsh place names.

References

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

Salter JW, *A Catalogue of the Collection of Cambrian and Silurian fossils contained in the Geological Museum at the University of Cambridge.* Cambridge University Press, 1873.

(KHN)

Climatica UK

Climatica is a climate science - public interaction website that has been developed over the past few years. The website is being developed in association with the Geological Society and the Quaternary Research Association (QRA). It aims to bring scientifically accurate information about climate change and environmental issues to the public in an accessible, engaging manner. Information on the website will include articles, fieldwork diaries, videos and diagrams. All content will be written by academics and postgrads, to ensure the integrity of the information.

We are now at the stage of collating material for the website, and have secured a number of articles from leading academics (John Birks, Ian Fairchild, and Mark Maslin). We would be delighted to receive further contributions to the website. The contribution can be of any nature (articles, fieldwork blogs etc), as long as the content concerns climate (palaeo, modern, or future).

If you would like more information on the project, or would like to contribute, please get in touch with us to let us know. Again, if you would like any more information on the website, or examples of previous articles please email, and we can send you them. All publications would fully acknowledge your authorship.

Please send emails to: Climaticauk@gmail.com

Kathryn Adamson, Tim Lane, and Richard Jones

In the footsteps (i)

Ty'n y groes to Gwynfynydd

The 1985 BGS publication "Geological Excursions in the Harlech Dome contains 8 "excursions" and a further 9 "notes on popular walks" (including the Precipice Walk" described in a recent newsletter). No 15 in the listing is a description of a circular walk from Ty'n y groes to Gwynfynydd. There is a signposted, free Forestry Commission Car park with toilet facilities at the starting point of the walk just off the A487 at Ty'n y Groes.

The following is a photographic update and accompaniment to the original notes of Allen and Jackson.

Locality 1

"Looking westwards through the trees, the terraces on the opposite bank of the river are clearly visible"

Locality 2

This cutting in the upper terrace gravels, appears to have been lost to a combination of weathering and vegetation growth.

Locality 3

Exposed Maentwrog Formation rocks, although heavy algae staining and slope debris and vegetation contrive to obscure much of the geological interest.

Locality 4

This appears to be the culvert referred to by Allen and Jackson, but there is little evidence of the small anticlinal structure referred to "*Just beyond the road fork a small anticline is exposed in a culvert on the low road*". Nice masonry work though.

Locality 5

"Grey microtonalite, which is pyritic and locally altered is exposed"

Locality 6

"*A partly filled trial level….blue secondary copper minerals staining the walls of the excavation show that the rock contains chalcopyrite"*

Locality 7

Poorly exposed "*green dolerite*" lost in slope debris and vegetation.

Locality 8

"*The underlying Gamlan Formation is exposed in the river*."

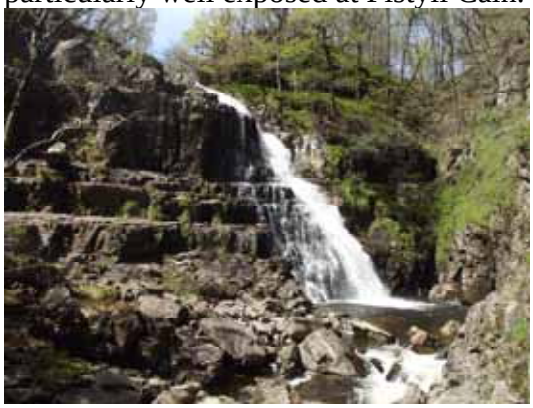
Locality 9

"*The large road cutting, opposite an old , overgrown stone building…"*

"….is in rocks of the Gamlan Formation. Mostly it consists of grey siltstone with thin sandstone beds and laminae of pinkish manganiferous rock composed of spessartine and quartz."

Locality 10

The waterfalls at Pistyll Cain and Rhaeadr Mawddach mark the faulted boundary between the Clogau Formation and Gamlan Formation. Easterly dipping bedding in the Gamlan Formation is particularly well exposed at Pistyll Cain.



Pistyll Cain

Rhaeadr Mawddach (Note pipework and old mine buildings associated with historic gold mining operations.)

Reference

Allen PM and Jackson AA, *Geological excursions in the Harlech dome*. Classical Areas of British Geology, BGS, HMSO, 1985.

(KHN)

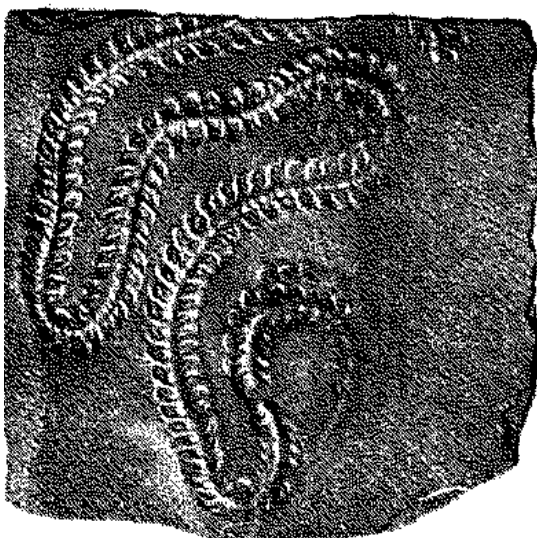
Discussions:

1. *Nereites cambrensis*

Keith Nicholls writes:

The observation in the last Newsletter (Issue No 69) that the NMW's holotype specimen of the trace fossil *Nereites cambrensis* (Murchison), and the figure presented in Murchison's "Silurian System" are, in fact, mirror images led to a flurry of correspondence between KHN, Colin Humphrey, Jerry Davies (BGS) and Cindy Howells (National Museum of Wales). The point up for discussion was whether the images appearance, in reverse, was a result of the reproduction process, or perhaps, it may be evidence that the original specimen was a part, and now missing, counterpart.

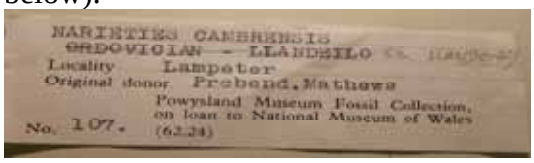
Original specimen (Part?) – Photograph by KHN, Copyright National Museum of Wales



As figured specimen in Murchison's Silurian System (Counterpart?).

The outcome of the discussions appear to have been settled with Cindy Howells' investigations which have indicated that the reproduction techniques would initially have involved generating a mirror image of the specimen, and it would be easier to reproduce in this form than to convert back. Until such time as a dusty counterpart is uncovered in a drawer at the Welshpool Museum, it seems probable that the inversion is simply an artefact of the reproduction process.

The task now at hand is to identify the location, and if possible, the detailed stratigraphic position of this specimen as the available evidence is somewhat imprecise, to the point of being contradictory (see Accession Note below).



Photograph by KHN, Copyright National Museum of Wales

In the original description Murchison records two new species of what he called "Fucoids". These are *Nereites cambrensis* and *Nereites sedgwicki* which are attributed to "the Cambrian Rocks of Llampeter" and are accompanied by the statement:

"Loc. Llampeter, Caermarthenshire. In the schistose building stone of that place, in which they were found by the Rev. A Ollivant, Professor of Llampeter College".

The rocks in and around Lampeter generally comprise Silurian Devil's Bridge Formation, but with the Hirnantian "Yr Allt Formation"[1] and lowermost Silurian Cwmere Formation located a few kilometres to the south west. Current enquiries are aimed at establishing whether or not Murchison's remarkable traces may be analogous with the widespread surface traces found in the "Yr Allt Formation" at Llangranog (see below).

"Nereitid" traces from Llangranog. Copyright Keith Nicholls, University of Chester

(1) Use of the name Yr Allt Formation has been abandoned following observations reported

by Davies et al (2009), and these rocks are now considered most likely to represent correlatives of the Brynglas Formation of the Aberystwyth district.

Colin Humphrey writes:

A final brief comment on the *Nereites cambrensis*. Together with another club member, I examined it on 30 May at Powysland Museum with a high magnification binocular microscope. We had previously wondered if it might be a grazing trace or a resting trace. I would definitely opt for grazing trace.

The descriptions of the lithology and geological time period are, as you say, confusing. Silurian System vol. 2. 699 describes it as "*found at Lampeter, Caermarthenshire, in the schistose building stone of that place*". It is fine mudstone, very micaceous with disseminated tiny mica flakes, metamorphosed to the point of being slaty (and with a cleavage only a few degrees different to the bedding), but hardly schistose. Lampeter of course is in Ceredigion but very close to the Carmarthenshire border.

Mention in Silurian System of these fossils being found in the Cambrian rocks (and the species name *cambrensis*) can be ignored, because in 1839 Murchison had ceded that western region to Sedgwick, as Cambrian System, and Murchison did not seek to recover it into his Silurian until the folded westward repetition to Cardigan Bay of Silurian rocks was recognised some years later.

It is intriguing to determine in which direction the creature was progressing as it foraged through the sediment. The lighting is critical in doing this. Under some lighting it looks to be going one way, and under other lighting it is going the opposite way. The confusion is seen

in the high magnification photo (below) where, because the track is meandering, adjacent tracks must be progressing in different directions, but do not always look to be so.

Murchison describes the body of this species as having about 120 segments, but this observation is only correct if it is a resting trace of the whole creature. If it is a grazing trace then we have no idea how many segments the creature had.

On the specimen the central body trace is raised, as is the back of the 'footmarks'. Thus we are looking at a cast on the underside of the overlying sediment. My colleague has photographed the central part of the specimen at high magnification and the trace is highly detailed and perfectly defined.

Close up of NMW type specimen. Photograph and copyright Bill Bagley.

The figure in "The Silurian System…." would have been engraved in reverse: the scraped out parts not taking ink and therefore appearing white as if reflecting light, and hence appearing raised. This too conveys the impression of a raised body trace and footprints. So it cannot be a counterpart.

The memoir for the Aberystwyth sheet (Cave and Hains, 1986) states on p49 that in the Devil's Bridge Formation there is an abundance of trace fossils in the form of arenite casts on undersides, and forms such as *Dictyodora* and *Nereites* are common. The memoir does not mention *Nereites* in the Aberystwyth Grits.

References

Murchison RI, *The Silurian System: Founded on geological researches in the counties of Salop, Hereford, Radnor, Montgomery, Caermarthen, Brecon, Pembroke, Monmouth, Gloucester, Worcester, and Stafford; with descriptions of the Coal-fields and overlying formations.* John Murray Publishers, London, (1839) (reprinted by Nabu Public Domain Reprints).

Davies JR, Waters RA, Williams M Wilson D, Schofield DI and Zalasiewicz JA, *Sedimentary and faunal events revealed by a revised correlation of post-glacial Hirnantian (Late Ordovician) strata in the Welsh Basin, UK*. Geol. J. 44: 322–340 (2009).

Cave R and Hains BA. *The Geology of the Aberystwyth District.* BGS Sheet Memoir (1986).

2. Carboniferous fish debris from Malltraeth, Ynys Mon

Following the recent work, reported by Barry Wrightson, on the fish debris in shale tips at Malltraeth in the Newsletter Geomon's Margaret Wood has noted that fish debris and insect fossils have been described by Paul Whalley from

these rocks previously. Paul has kindly agreed for extracts from his original article to be reprinted in our Newsletter. The following is a somewhat abridged version of the original:

"A share of the spoils"

While coal mines may be the first thought when Wales is mentioned this is not what comes to mind about the island of Anglesey, off the country's north-west coast. Geologically it is better known for its Precambrian rocks made famous by the work of Greenly earlier this century.

The Anglesey mines were never noted for good quality coal and flooding was a continual problem. The earliest mines were in action in the 15th Century. The last closed before 1880. The Menai Colliery Company had some 24 shafts in the area, at depths from 60m to 183 m. All the records of fossils in the Coal Measures in Anglesey come from a few isolated spoil heaps and were examined over 50 years ago.

Malltraeth Marsh is also an important wildlife area. The Royal Society for the Protection of Birds (RSPB) bought part of the Malltraeth Marsh, intending to extend the reed beds and encourage the return of the bittern and other rare birds formerly fond here. Much of the marsh, lies within a large SSSI selected for outstanding grazing marshes, breeding birds and insects.

What the RSPB had not appreciated was that it had also bought several of the spoil heaps from the disused coal mines. On a visit with Wildlife Trust members and the RSPB warden, I became aware that our observation mound was one of these spoil heaps. I later found plant fossils and a scrap of (probable!) fish scale. The RSPB was delighted, and the RIGS group was invited to examine the area and to consider its Earth heritage conservation. We also undertook to collect fossils from the spoil heaps and report to the RSPB. Naturally as a palaeoentomologist, I was hoping to repeat my earlier work with the Bolsover Dragonfly, a giant Carboniferous *Meganisoptera* from Derbyshire by finding an even larger "giant dragonfly" at Malltraeth.

Finding any fossil insect would be a bonus, since I believe that none has been found in the North Wales coalfields. Fossil insects are fairly common in the Upper Carboniferous and help to provide additional information about the environment. Carboniferous insects vary tremendously in size and structure and present many interesting adaptations. For example, some had eye-spots on the wings. In modern insects such as peacock butterflies, eye-spots are used to scare predators, Sometimes they are connected with display. Clearly there was a use for eye-spots in the Carboniferous, even if we are not exactly sure what this was. Some of the insects had modified forelegs, rather like praying mantis, and probably used them in a similar way. The insects in the Carboniferous also had the air to themselves; it would appear they were the only flying animals. Perhaps the giant size of some was due to the lack of competition?

The published records from the Anglesey Westphalian (Upper Carboniferous) are few and contain little extra information and, so far, no specimens extant. These records include *Lepidodendron, Calamites, Neuropteris* as well as fish including Coelocanths and molluscs. My first examination has shown *Lepidodendron*, fish fragments, a possible "crustacean", brachiopods and plenty of other plant fragments. The site deserves fuller examination and this we hope to do over the next few years.

Access to the site is restricted and permission is needed from the RSPB. It would help if Gwynedd and Mon RIGS Group could be contacted before any visit and details of fossils recovered sent to them.

In October 1996, some 29 members of the North Wales Wildlife Trust and the Gwynedd and Mon RIGS Group collected specimens from the spoil heaps and examined them under the microscope (Courtesy of Nigel Brown at the University Botanical Gardens in Bangor). Fragments of plant material, mainly Calamites, fish scales and a small insect were found.

Paul Whalley

Post Script
The site has since been designated a Gwynedd and Mon RIGS site with a report that is held in Cofnod record Centre, Parc Menai, Bangor
Margaret Wood

Post-post Script
Whilst news of the fact of early publication relating to fish fragments, plant fossils and even insects is disappointing (no scoop it seems for the Newsletter), Barry's findings on the shoaling traces are, as far as I am aware, unique - on a global basis. The Malltraeth spoil heaps appear to remain a remarkable resource for real scientific study. It is anticipated that the subsequent NWGA visit to the area will also be described in a future edition of the Newsletter
KHN

Reference:
Whalley P.; *A share of the spoils.* Earth heritage, Issue No 7, January. p9. (1997).

Abstracts:

Field Visit: Glacial Sediments in and around Dinas Dinlle, Llyn.
Visit to be undertaken on 2nd September led by Dr Geoff Thomas of Liverpool University

This visit will study Pleistocene Late Devensian glacigenic sediments and landforms along the north coast of the Llyn Peninsula. These sediments document the advance and retreat of the eastern margin of an Irish Sea Ice Stream that met, coalesced and ultimately uncoupled from ice radiating outwards from Snowdonia. Across the boundary of the two ice masses is a set of sediment-landform assemblages that reflect rapidly changing erosional and depositional conditions.

The assemblages range outwards from a sub-glacial depositional assemblage, characterised by drumlin swarms (Western Anglesey); through a sub-glacial erosional assemblage, marked by prominent bedrock scours and large subglacial rock channels (Menai Straits and Arfon); through an ice-marginal assemblage, identified by closely-spaced, glacio-tectonised push moraines and intervening marginal sandur troughs (Dinas Dinlle, Pontllynfi, Aberafon and Nefyn); into a freely expanding proglacial sandur and lacustrine delta assemblage (Cors Geirch). Together the assemblage provides evidence for numerous oscillatory episodes during retreat and at least twenty ice-marginal limits can be identified. At least eleven of these display multiple criteria for identifying readvance and, in the ideal case, is characterized by a moraine form built by localised tectonic stacking of diamict to the rear, fronted by a clastic wedge of ice-front alluvial fan gravel and intercalated flow till. The distribution of sediment-landform assemblages suggests a highly dynamic, convergent ice-stream flow pattern, with high ice velocity, a sharply delineated lateral shear margin, pervasive ice-marginal glaciotectonic deformation and a tightly focused ice-marginal sediment delivery system; all signature characteristics of contemporary ice streams.

We shall also look at some Pillow lavas from the older end of the geological column!

Misunderstanding, myth or might BE? The discovery of upper palaeolithic rock art in South Wales
Talk to be given to NWGA on 19th September by Dr George Nash, Dept. of Archaeology & Anthropology, University of Bristol & SLR Consulting.

In September 2010 new prehistoric rock art was discovered in a cave on the Gower Peninsula, South Wales. One of the images clearly represented a cervid, possibly a reindeer. Fortunately, part of the engraving was covered by a stal flowstone deposit and this was subsequently dated using Uranium Series dating. This presentation charts the processes of discovery, validation and debate of Britain's earliest rock art.

Book Review:

The Oxford Book of Modern Science Writing (edited by Richard Dawkins) Oxford University Press, 2009, 419pp.

Richard Dawkins has collected an eclectic mix of some of the very best of science writing, from some of the key

individuals who have contributed to the body of modern scientific literature. They are (nearly) all here…Schrodinger, Feynman, Einstein and Hawking from the world of physics, Turing and Penrose for the mathematicians, Gould and Huxley for biology, and representing geology, Richard Fortey (one of the few writers to be selected twice).

In total there are 83 short extracts from works covering almost the full range of scientific endeavour. Dawkins divides these into four subject parts:

- What Scientists Study
- Who Scientists Are
- What Scientists Think
- What Scientists Delight In

This is something of an arbitrary classification and the chosen extracts do reflect Dawkins' own particular selection bias, with his version of the global science paradigm being dominated by the broad churches of philosophy, palaeoanthropology and evolution.

Personally I would have preferred if the book could have been organised chronologically, so that parallel developments in fields of say genetics, chemistry and evolution could be read in the sequence as published. Perhaps that is just the geologist in me ("..younger on top of older…")?

So very little on deep space astronomy, and nothing on geology that is not derived from the palaeontological wing, of our subject. There is no Alvararez on the K/T impact, no Wegener on Plate Tectonics.

Despite the lack of broad geological interest, this book, at £9.99 in the soft cover version, is great value to have in the house; and in particular I suggest beside the bed. The reason for this is the length of the articles. At typically no more than 3 or 4 pages each you can switch off from the mundane worries of our day to day lives, in the company of some of the world's greatest thinkers, read for 5 minutes on a matter of weighty or profound concern, and fall asleep, without the need to work your way through poorly written, or badly translated, dry technical prose.

Sweet Dreams…!

PS Those interested in the place of women in science may want to use this book as ammunition. I counted only two and half female authors, Rachel Carson and Helena Cronin, and a short shared piece of comic poetry from Barbera Gamow writing with her husband George.

(KHN)

Reports:

Geoscience Wales Cluster Meeting
19th April 2012
Peak Oil – Crisis what crisis?

This Geoscience Wales meeting was held in the plush surroundings of the Royal Cambrian Academy in Conwy. The meeting was very well supported, and together with our own recent good attendances it seems that geology in North Wales at the moment is in a vibrant state of health.

This talk however, delivered by R G Miller, an independent specialist adviser on energy policy, who suggested that the world economy, and in particular our reserves of oil, are in a far less healthy condition. The fundamental reason for this is that whilst our insatiable demand for oil seems to show no sign of abating, the cost of new exploration, and of upstream development costs, means that the unit cost of bringing the oil to the pump is likely to rise rapidly. The assertion was brought home by the statement that 25% of current crude oil production is delivered from some 20 fields. No less than 16 of these are considered to be in decline. In painting, what was openly acknowledged as, something of a doomsday scenario Miller suggested that it seems likely that 2015 will see serious fuel price inflation, and by 2020 we should expect consequent global civil and political unrest.

The evening was made particularly memorable for our own Treasurer who, on hearing the words whisky and cake in the same sentence, was first to rise from his chair to assist with an entertaining illustration of fluid flow in a porous medium. The talk was well received by an appreciative audience.

(KHN)

Geoscience Wales Cluster Meeting
17th May 2012
Mudstones and shale gas reservoirs

Kevin Taylor of Manchester University presented an interesting talk on his team's investigations into the macro and micro scale fabrics associated with shale gas reservoirs. Unlike conventional oil traps, which are typically secondary reservoirs (where hydrocarbons collect following migration from a remote source) these "unconventional" resources reflect oil preserved in-situ, within the rocks in which the organic matter was originally trapped. The negligible primary permeability of the mudstones means that detailed understanding of the original porosity, and potential for inducing new porosity (by "fracking") is very important.

Following the presentation there was an interesting discussion session, and a warm vote of thanks offered to the speaker.

(KHN)

New Publications relating to North and Mid Wales

Botting J.P., Muir L.A., Van Roy, P., Bates, D. and Upton, C. *Diverse Middle Ordovician palaeoscolecidan worms from the Builth - Llandrindod inlier of Central Wales.* Palaeontology Vol 55 Part 2, pp 501- 528 (2012).

Compston W. and Gallagher K. *New SHRIMP zircon ages from tuffs within the British Palaeozoic stratotypes.* Gondwana Research, Elsevier (2012).

Morrissey L.B., Hillier R.D., Marriott S.B., *Late Silurian and Early Devonian terrestrialisation: Ichnological insights from the Lower Old Red Sandstone of the Anglo - Welsh Basin, UK*. Palaeo-geography, Palaeo-climatology, Palaeo-ecology Volumes 337–338, pp 194–215 (2012).

Talbot J. and Cosgrove J., *The Roadside Geology of Wales.* Geologist's Association Guide No 69 (2011).
(If anyone has purchased a copy of this please let us have a review for the Newsletter).

Dates for your Diary:

NWGA
June Field Meeting:
Saturday 30th June
Malltraeth, Ynys Mon
(Please note this is an erratum / correction) The previous Newsletter indicated the field trip was on Sunday rather than Saturday – apologies for any confusion. All other details remain as originally published. Contact Cathy O'Brien for joining instructions.

September Field Meeting:
Sunday 2nd September
Quaternary of Dinas Dinlle
See extended abstract included in this newsletter. For joining details contact Cathy O'Brien

Autumn Evening Lectures

September 19th
Dr George Nash, (Dept. of Archaeology & Anthropology, University of Bristol & SLR Consulting)
"Misunderstanding, myth or might be? The discovery of Upper Palaeo-lithic rock art in South Wales"
Pensychnant, Conwy, 7:30PM Sharp

Oct 26th (Joint Meeting with the North West Group of the GSoL)
Keith Nicholls (University of Chester & Geotechnics Ltd)

"*The Big Chill - Death and destruction in* the *Hirnantian*" Location to be confirmed (Chester Area).

OTHER ORGANISATIONS EVENTS

Geological Society – History of Geology Group
22nd-23rd October
Appreciating Physical Landscapes: Geotourism 1670–1970
The Geological Society, Burlington House, London

EIG Conferences
5th – 7th September
Edge Hill University, Lancashire
Extractive Industry Geology 2012
http://www.geolsoc.org.uk/webdav/site/GSL/shared/pdfs/events/EIG%202012%202nd%20Circular.pdf

Shropshire Geological Society
Autumn 2012, exact date tbc: *The Future of the Universe* (guest speaker: Lord Rees of Ludlow, Astronomer Royal and President of the Royal Society) - to

be held in the Ludlow Assembly Rooms, organised by the St Laurence's Conservation Trust - further details from the SGS web site at: http://www.shropshiregeology.org.uk/SGS/SGSEvents.htm

GeoMon

Research Workshop
25th and 26th July 2012
"The Pre-Cambrian to Palaeozoic rocks of Anglesey and the Lleyn Peninsula; framework and tectonic development". More details available at: http://www.geomon.co.uk/#/workshop/4561767403

Monday 17 September
Llanddwyn Island
Meet at 12.45am for 1.00pm start. Start from Newborough Beach Car Park
Sunday 14 October
Holyhead Mountain Geo Walk –
Start at 10.00am Meet at RSPB Car Park on the Range
Wednesday 17 October
Llanddwyn Island
Meet at 12.45am for 1.00pm start. Start from Newborough Beach Car Park
Wednesday 14 November
Llanddwyn Island
Meet at 11.45am for 12.00pm start. Start from Newborough Beach Car Park
Wednesday 12 December
Llanddwyn
Meet at 10.15am for 10.30am start. Start from Newborough Beach Car Park

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.

Web News:

1) Geophysics
A substantial catalogue of UK geophysical data is available on line at: http://www.ukogl.org.uk/. UKOGL was

established in 1994 in conjunction with the Department of Trade and Industry now the Department of Energy and Climate Change (DECC) and the UK Onshore Operators Group (UKOOG). The Library manages the archive and official release of 2D and 3D seismic data recorded over landward areas of the UK. By agreement with the DECC and HMSO, the Library operates as a registered charity, funded by revenues raised from data sales and donations, with the long term objective of bringing all available UK onshore seismic data into secure archival storage, whilst providing efficient access to all interested parties.

2) Palaeontology
Royal Society Publishing have made a Special Edition of Biology Letters on "Models in Palaeontology" freely available on line. This includes 12 papers, frankly, likely to be of interest only to the specialist, on a range of

palaeontological subjects. This publication can be found at: bit.ly/palaeoSF

Other publications of palaeontological interest are available at: rsbl.royalsocietypublishing.org/cgi/collection/palaeontology

3) NWGA
Our Facebook and Linked-in pages are slowly attracting a select band of followers. Please take a little time to visit and "link" or "join" as appropriate at:
http://www.facebook.com/groups/northwalesga/
and
http://www.linkedin.com/groups?gid=3031675&trk=myg_ugrp_ovr

The Facebook page in particular is full of a wide range of interesting links. At the moment these are being updated regularly. We do however need to see more activity to continue to keep the sites fresh and updated.

Finally a reminder of the NWGA Web site itself at: www.ampyx.org.uk/cdgc
The web site has been updated recently with all editions of the Newsletter now available, except the current one, for direct download.

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