

The background of the entire page is a close-up photograph of fossilized fern leaves. The fossils are dark brown to black, showing the intricate vein structure of the leaves. They are set against a lighter, textured rock matrix. The lighting creates highlights and shadows that emphasize the three-dimensional nature of the fossils.

Cymdeithas Daeareg Gogledd Cymru
North Wales Geology Association

NEWSLETTER

Issue 91

January 2016

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Front Cover Image: Close up image of some of the cabinet display material featured along with the *Calamites* specimen at Wrexham Museum's Fossil Forest Exhibition. Specimens include one *Annularia stellata* (top right) and a number of *Alethopteris serli*.

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Chairman's Message

It seems that one has to take a very long-term view of events that have unfolded in the history of our Association! I never imagined, back in December 2004, standing in a cold, damp and inhospitable open-cast mine that I would be attending a meeting in Wrexham Museum to celebrate the opening of an exhibition to display the extraordinary

fossil riches of the Brymbo

Steelworks site under the title "Swamp Land: Brymbo 300 million years ago".

It is true, though, that the dedication of a number of people within commercial, environmental, academic, curatorial and non-professional affiliations has succeeded in bringing the attention of the world to a small corner of the Denbighshire

coalfield, which has now become a SSSI and spawned research papers into the mode of life of the plants whose remains are so spectacularly represented. One particularly fine 'tree' fossil stands reconstructed as the focal point of the exhibition for the general riches of the site, which remain to be excavated and conserved - actions that cannot proceed without proper protection from the elements. The supporting cast of fronds,



cones, seeds, leaves and occasional critters are presented in display cases which tell the story of the Carboniferous coal swamps which covered a simply staggering area when you consider the modern extent of the "Productive" (or "not so Productive any longer"?) Coal Measures. These treasures must only be taken in context, however, as they are simply the best of the locally collected specimens, and they are neither enhanced

by extensive preparation, nor are they internationally famous exemplars.

What they do represent is the diversity of the site, which was described by Professor Barry Thomas as "probably the World's best assemblage of fossil plant material it has been my fortune to examine in the World" during his lecture to the Association in 2014. The exhibition runs until 4th June 2016.

There are poignant reminders, though, of how life has changed within the more recent past. One display case contains part of what is claimed to be the last billet of steel to be

rolled in the mill at Brymbo, reminding us that without the closure and remediation of the site these discoveries would not have been made. Another museum, elsewhere of course, contains a display of the last ton of deep-mined coal from the UK. It is within the memory of the Association that the Point of Ayr Colliery closed in 1996, and

it is astonishing that King Coal has finally been laid to rest after a very long reign. Yes, I know that UK open-casting is still active and that excavators are still ripping into the strata in other countries for export to keep our lights on, but even our part in that story is scheduled to end in the medium term. What Donald Trump and the resurgent Republicans will do for the Appalachian and Powder River coal miners in the USA remains to be seen, of course - since they are not strong believers in climate change, which is the driver of our own fossil fuel policies. As an aside, I recall discussing early in the history of the NWGA committee the possibility of an underground visit at Point of Ayr, which had been surprisingly welcoming of visitors in the past. The response was swift, and that 'political issues' ruled out the possibility and news of the impending closure followed.

Elsewhere, the politically-motivated oil-price crash has seen a major shake-down in employment for petroleum exploration professionals, not all geologists by any means as drilling-rigs and survey craft are laid-up. And then there are those more fortunate in that their long-pursued production has finally come on stream, only to find that the financial basis of their endeavours is now hopelessly uneconomic. Troubled times indeed, except perhaps for the petrol buying public, who are delighted at sub-pound per litre headline pricing at the pumps. Did you notice that shale-gas has gone quiet in recent months? That's what the politically motivated oil-price crash is all about, and I'm sure that silence will prevail until something like the 'old order' is re-established.

Now, discussion of oil prices reminds me that there is something of a change for 2016. Since the inception of the Association the principal membership rate has been £10 per year. For a long time the frugal regime and lower activity profile meant that a steady surplus of funds was

accrued annually, and after quite a few years this became larger than was acceptable. So it was decided to hold the subscription at the same historic rate, even as the operating costs of the annual programme increased significantly, thus leading to an annual deficit and draw-down of the fund in the bank.

Your committee has now proposed, and the AGM voted for the resolution, that the principal membership rate be increased to £15, a figure that was determined to nullify the annual deficit on the basis of the 2015 membership profile in which approximately one-third of members pay the concessionary rate of £5, which will not be changed. You will see this change on the 2016 membership form which will accompany this Newsletter, or appear in the post very shortly after the electronic version. We hope that your loyalty will not be tested too severely, and that we will enjoy your company for the rich programme of meetings that will come your way over the next year.

Jonathan Wilkins

Articles:

Lion Salt Works Restored to Life

In 1997, soon after I began to study geology, I visited what remained of the dilapidated buildings of the Lion Salt Works, at Marston, near Northwich, which had ceased production in 1986.



Figure 1: The site before restoration (copyright Fred Owen)

There I discovered how table and cooking salt had been produced from brine by the ‘open pan’ method. The buildings were Grade 2



Figure 2: “The Rock Stars” (Our chairman resplendent in red next to the author in the back row)

listed in 1986 and were designated a Scheduled Monument by English Heritage in 2002. Since then I have driven past the boarded-up site many times, and reflected

on what ten further years of decay had inflicted on the site.

In 2008, after much research and hard work, funding was secured to restore the Works into a museum at a cost of £10m. Restoration work began in July 2009, was completed in Sept 2014 and the Works re-opened in June 2015 (Hewitson, 2015).

On 4 November Marketing Cheshire (of Chester and Cheshire West Council) organised a ‘Geology Event’ at the Works especially for geologists (referred to in the press release as ‘Rock Stars’!) representing their organisations locally and nationally. Our Chairman, Jonathan, was there representing NWGA and I represented the Manchester GA. It was also encouraging to meet there a group of enthusiastic geology pupils, with their teacher, from Caldy Grange Grammar School in the Wirral.

We were introduced to the complexities of the restoration, by a laser generated fly-through video. Because of the poor state of the buildings – some were being held up by the strength of the roof - they were too dangerous for surveyors to enter. This was quite remarkable and emphasised the care and skill needed by all those involved in the works to bring the project to a safe conclusion. It is the first restoration project in the country to adopt this technique.

The exhibits cover the social as well as the working aspects of the ‘open-pan’ method of salt production, so you pass through the Red Lion pub, which was built on site for the workers to quench their thirst after long hours in the evaporation rooms. Every effort has been made to re-create the ‘humid working atmosphere’ in the sweltering rooms where the brine was boiled in open, iron pans and the salt scraped to the sides to be collected and put into wooden containers to be dried.



Figure 3: Exhibition image of the salt pan process – copyright Cheshire Museums – reproduced with permission.

There are exhibits of the drying, cutting and grinding of the salt blocks and hands-on demonstrations of crystallising salt as well as models and sections showing the geology of the strata comprising the salt beds.

A major part of the museum is devoted to the disastrous effect wild-brine pumping had on undermining the ground stability and the resulting impact on houses, roads and the salt mines themselves, to form the ‘flashes’ – sunken areas filled with water where the land collapsed into the mines.

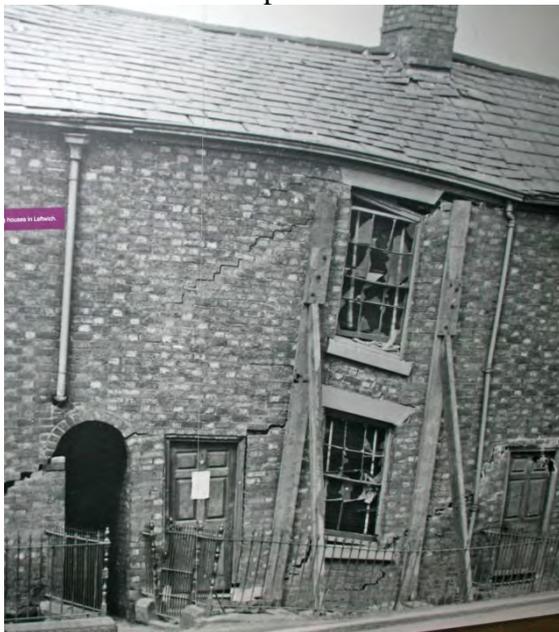


Figure 4: The result of salt subsidence– copyright Cheshire Museums – reproduced with permission.



Figure 5: Neumann's Flash Habitat creation (copyright Fred Owen)

The exhibition concludes with the positive outcome of the new habitats and nature reserves that have been reclaimed from what was once an industrial wasteland.

An interesting 2-minute aerial film of the Lion Salt Works is available at: <https://vimeo.com/132320192> (This link is free to download and to embed on websites, courtesy of M7Aerial and Marley Eternit).

The museum is an impressive reconstruction and representation of the original ‘open-pan’ method of salt production and brings home how important a raw material salt has been, and still is, in everyday life. In conversation, Professor Chris Jackson, Imperial College, who now specialises in salt tectonics, remarked that ‘salt comprises just 1 – 2 % of the sedimentary succession but forms the seal for all the major oil and gas reservoirs in the world’. Without doubt, you will find a visit full of interest and wonderment at the toils and tribulations that were endured to bring us that essential additive to our diet, especially our fish and chips!

Continuing the heritage of salt theme, there is another Cheshire initiative called ‘Saltscape’. It is a new partnership to protect, enhance and celebrate the unique landscape of the Weaver Valley by connecting heritage, nature and people related to the legacy of Salt. It has funding

of £1.4m from the Heritage Lottery Fund, spread over three years, to achieve its aims. One of the partners is Cheshire RIGGS involving Prof Cynthia Burek, of the University of Chester. I have become involved as a committee member of the Northwich and District Heritage Society, and have agreed to lead a geology walk round Frodsham for Saltscape in May next year. Further details can be found at www.saltscape.co.uk.

Fred Owen

Reference:

Hewitson, Chris, 2015, The Open Pan. “The Archaeology and History of the Lion Salt Works”. West Cheshire Museums. ISBN 978-0-9932835-0-5

This is an abridged version of a report first published in the Manchester Geology Association – reproduced with permission.

Post-Christmas Quiz

The following are some brilliant field notes made in the aftermath of an earthquake. They really reinforce the idea that the most important scientific instruments are the human eyeballs and brain. I have pulled all the personal and place names etc., so read it and answer the questions at the bottom.

“Shortly after the shock, a great wave was seen from the distance of three or four miles, approaching in the middle of the bay with a smooth outline; but along the shore it tore up cottages and trees, as it swept onwards with irresistible force. At the head of the bay it broke in a fearful line of white breakers, which rushed up to a height of 23 vertical feet above the highest spring-tides. Their force must have been prodigious; for at the Fort a cannon with its carriage, estimated at four tons in weight, was moved 15 feet inwards. A

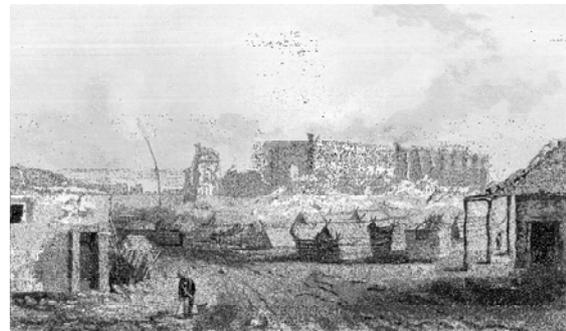
schooner was left in the midst of the ruins, 200 yards from the beach. The first wave was followed by two others, which in their retreat carried away a vast wreck of floating objects. In one part of the bay, a ship was pitched high and dry on shore, was carried off, again driven on shore, and again carried off. In another part, two large vessels anchored near together were whirled about, and their cables were thrice wound round each other; though anchored at a depth of 36 feet, they were for some minutes aground. The great wave must have travelled slowly, for the inhabitants had time to run up the hills behind the town; and some sailors pulled out seaward, trusting successfully to their boat riding securely over the swell, if they could reach it before it broke.”

“In almost every severe earthquake, the neighbouring waters of the sea are said to have been greatly agitated. The disturbance seems generally to have been of two kinds: first, at the instant of the shock, the water swells high up on the beach with a gentle motion, and then as quietly retreats; secondly, sometime afterwards, the whole body of the sea retires from the coast, and then returns in waves of overwhelming force. The first movement seems to be an immediate consequence of the earthquake affecting differently a fluid and a solid, so that their respective levels are slightly deranged: but the second case is a far more important phenomenon. During most earthquakes, it is certain that the first great movement of the waters has been a retirement. Some authors have attempted to explain this, by supposing that the water retains its level, whilst the land oscillates upwards; but surely the water close to the land, even on a rather steep coast, would partake of the motion of the bottom: moreover, as urged by Mr. X, similar movements of the sea have occurred at islands far distant from the chief line of disturbance. I suspect (but the subject is a very obscure one) that a wave, however produced, first draws the

water from the shore, on which it is advancing to break: I have observed that this happens with the little waves from the paddles of a steam-boat. It is remarkable that whilst towns situated at the head of large shallow bays, have suffered during every severe earthquake from great waves, another, seated close to the edge of profoundly deep water, has never been overwhelmed, though so often shaken by the severest shocks. From the great wave not immediately following the earthquake, but sometimes after the interval of even half an hour, and from distant islands being affected similarly with the coasts near the focus of the disturbance, it appears that the wave first rises in the offing; and as this is of general occurrence, the cause must be general: I suspect we must look to the line, where the less disturbed waters of the deep ocean join the water nearer the coast, which has partaken of the movements of the land, as the place where the great wave is first generated; it would also appear that the wave is larger or smaller, according to the extent of shoal water which has been agitated together with the bottom on which it rested.”

“The most remarkable effect of this earthquake was the permanent elevation of the land, it would probably be far more correct to speak of it as the cause. There can be no doubt that the land round the Bay was upraised two or three feet; but it deserves notice, that owing to the wave having obliterated the old lines of tidal action on the sloping sandy shores, I could discover no evidence of this fact, except in the united testimony of the inhabitants, that one little rocky shoal, now exposed, was formerly covered with water. At the island about thirty miles distant, the elevation was greater; on one part, the Captain found beds of putrid mussel-shells still adhering to the rocks, ten feet above high-water mark: the inhabitants had formerly dived at lower-water spring-tides for these shells. The elevation of this

province is particularly interesting, from its having been the theatre of several other violent earthquakes, and from the vast numbers of sea-shells scattered over the land, up to a height of certainly 600, and I believe, of 1000 feet. Elsewhere, as I have remarked, similar shells are found at the height of 1300 feet: it is hardly possible to doubt that this great elevation has been effected by successive small uprisings, such as that which accompanied or caused the earthquake of this year, and likewise by an insensibly slow rise, which is certainly in progress on some parts of this coast.”



Who is the author?

Who is Mr X?

Who is the Captain?

Where are we?

...and when was the earthquake?

Answers next time, and, if Keith is sufficiently demanding, and promises me a beer, there will be a slightly more workmanlike article, though probably on an industrial archaeology theme, only marginally worthy of inclusion in this newsletter.

Julian Bridges

Editor's Note:

When and where do you wish to claim your prize Julian?

Citizen Science Search - Fossil Finder

Bored during these dark winter nights? Missing the summer field trip season? Then fear not as help is required 'finding fossils' and all from the comfort of your warm sofa (with laptop), office or whatever means you access the internet.

Help is required as part of an ongoing research program exploring fossil bearing landscapes in the Turkana Basin, Northern Kenya. This is achieved by documenting what you can see on surface images, be that surface geology, lithology, fossil fragments or other cultural artifacts. The work is a joint collaboration of the University of Bradford and the Turkana Basin Institute to interpret the past environments of our ancestors around Lake Turkana going back 6 million years. By analyzing the images, the ground team can target the exact place and visit to collect specimens gradually exposed by erosion of the surface.

So, how does it work?

Firstly, an image is provided and multiple-choice answers offered e.g.

- OK to Study
- Too blurry
- Too noisy (speckled)
- Too bushy
- Too dark

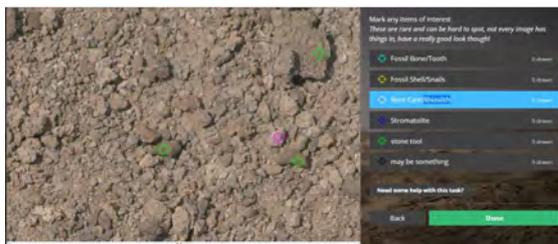


Figure 1: Screen Shot

Selecting any of the four latter options, takes you on to the next image. Selecting

'OK to Study' leads to a series of further multi-choice questions:

Density of surface rubble:

- 0-20%
- 20-60%
- 60-100%

Do you see any of these rocks, clasts or minerals:

- Basalt?
- Pumice?
- Quartz?
- Calcrete?
- Sandstone?

It is possible to mark up to 3 of each option if applicable, along with extra menus as required for colour, grain size etc)

Items of Interest:

- Fossil Bone/tooth
- Fossil shell/snails
- Root cast/Rhizolith
- Stromatolite
- Stone Tool, or
- 'may be something'?

(Extra menus are again provided where applicable, e.g. to distinguish oyster, other bivalve, gastropod or even 'not sure')

At any point in the proceedings, the 'Need some help' option is available to help in understanding what you are looking at. This is provided in the form a series of example pictures depicting typical lithologies or fossils alongside accompanying explanatory text. These I found were extremely useful in helping you get your eye in.

On completing a review, a summary is provided and the opportunity to either move to the next image or even 'Talk' if one needs to ask questions or clarify something. There are also blogs available with various discussion threads. After

examining 5 or so images, one is asked to register (free) and contribute further, perhaps even getting your name acknowledged in any future discoveries/publications.

So there you are, fossil hunting from the comfort of your own home. It could catch on.....well at least until the long, warm days of next summer's field season ;-). If interested see www.fossilfinder.org

Gary Eisenhauer

CALL FOR WRITERS WITH A GOOD UNDERSTANDING OF BRITAIN'S GEOGRAPHY

The Project

"We see nothing till we truly understand it", wrote landscape painter John Constable. Many of us enjoy admiring spectacular landscape views but how often do we really know what we are looking at?

This is a question behind Discovering Britain (www.discoveringbritain.org) a project delivered by the Royal Geographical Society (with IBG) which features over 150 geographically-themed activities. Each one aims to tell the stories behind Britain's diverse landscapes improving the public's understanding of the challenges and opportunities facing places, environments and people in the 21st Century.

With self-guided walks (3-10 miles), shorter trails (1-3 miles) and viewpoints (15 minute snapshots) the project takes famous vistas, quirky objects, impressive landscapes or urban contradictions and provides an insight into Britain's rich geography – from physical processes to human, economic and cultural debates.

Discovering Britain enables people to explore a more interesting set of questions:

- Why is this place like this?
- What is happening here and how is it changing?
- How is it connected to other places?
- Why do we see or think of a place in this way?

From exploring the shrinking Fens of East Anglia to questioning regeneration around the Olympic Park, from the wilderness of Rannoch Moor to a chocolate factory in York, the trails and viewpoints seek to unearth and tell a variety of stories about Britain's geographical past, present and future.

The Brief

Discovering Britain is looking for professional writers with a good geographical understanding and background in landscape interpretation to suggest and write new viewpoints (15 minute snapshots of a place and its geographical story).

This is your opportunity to tell the story of a landscape you know well, one that interests you or one that you think would inspire others to understand its geography. We are looking for approximately 300-400 words of text, a strong lead photo of the viewpoint / place, 2-3 accompanying images and practical information on how to get there etc. The fee for this work is £50.00

The Process

1. Take a look at the current viewpoints on the website to familiarise yourself with the content and style.
2. Complete the submission form to briefly describe a viewpoint and tell us a bit about yourself.

We aren't looking for a finished product at this stage, we would just like to:

- a) get a sense of how you write and what you see in a landscape, and
- b) find some new ideas of fresh viewpoints that may have a geographical story we hadn't already thought to explore

3. Discovering Britain will then select a number of writers to join the project – this will be based on your writing style, understanding of geography, originality of ideas and ability to fill in some of the geographical and thematic gaps in the current content.

4. The selected writers will then be commissioned and sent a resource pack. The viewpoint you go on to write could either be one you have put forward, or one Discovering Britain would like you to develop.

5. The finished viewpoint will then be published on the Discovering Britain website, and full credit given to the author. Writers will be paid a fee of £50.00 for each commissioned viewpoint.

Specific geographical regions we are particularly keen to gain more content on include South and North Wales, Cumbria and Northumbria, the Highlands and Islands, the Scottish Borders and Northern Ireland however all parts of Britain will be considered.

What next?

Click on this link <http://goo.gl/forms/5mQZUzR1Da> and complete the submission form to describe a viewpoint and tell us a bit about yourself. Return it to us by **March 4th 2016**. We will get back to you by March 21st to let you know if your submission has been successful and whether we'd like to commission you.

If you have any other questions, please contact Caroline, Rory or Jo on discoveringbritain@rgs.org

We look forward to having you involved in the project!

Royal Geographical Society

Further Discussion on
“What's this then?” Issue
89, September 2015 – by
Jan Heiland



Copyright Jan Heiland

I believe that I can provide support for the view expressed in the previous Newsletter, that this object is not a geological feature but likely to be of man-made origin. If this is indeed the case I am intrigued at its possible provenance.

The stone was found on the SE face of Elidir Fawr, above Llanberis and appears to be engraved with artwork comprised of regular lattice type patterns, shown in the last Newsletter. In this area of North Wales we would naturally consider a Celtic origin but I suspect our subject may be a lot older than that. I suggest a possible Neolithic era.

Stones found in Neolithic passage and gallery tombs are often inscribed with artwork comprising rhomboid, herring

bone or zig-zag patterns and I think there are clear indications of such patterns on the Elidir Fawr stone. Snowdonia has a rich variety of Neolithic features but the nearest significant burial chamber in relation to the site where the stone was found is the Neolithic cromlech of Barclodiad y Gawres on Anglesey and so we are perhaps looking at around 3650-3390 BC. Within the chamber of Barclodiad y Gawres there are a number of inscribed stones, some bearing zig-zag patterned artwork.

The Anglesey site artwork is also similar to that found on Irish (Boyne Valley) Neolithic tombs which in turn have comparisons with more northern areas of the British Isles. On 31st July 2013 an inscribed stone was found at the base of a Neolithic tomb on the Ness of Brodgar in Orkney. The stone is decorated with art work on both sides and has been described as the ‘finest ever to be found in Britain’.

I see a striking resemblance between the art work of the Brodgar Stone and the interwoven lattice patterns on the Elidir Fawr stone. The Elidir Fawr stone was found in a boulder debris field at about 2,400 feet above sea level, so another question is ‘What is it doing there?’

We do know that the famous bluestone megaliths of Stonehenge were quarried and dressed in the Preseli Mountains of Pembrokeshire before being transported to Wiltshire. Perhaps the Elidir Fawr stone was being processed for delivery to another site but was abandoned for some reason which we will never know.

Graham Panes

Editor’s Note:

Graham’s original piece was supplied with some very interesting images, but I have not been able to establish proper copyright authority, so rather than go with the “publish and be damned” option, and risk Jonathan’s ire, I have pulled them. I suggest that should you wish to compare these acknowledged archaeological items with Jan’s Elidir Stone you go to the following web sites:

Barclodiad y Gawres

<http://www.megalithic.co.uk/article.php?sid=1492>

Boyne Valley

<http://www.ancient-wisdom.com/irelandboynevalley.htm>

Brodgar Stone

<http://www.bbc.co.uk/news/uk-scotland-north-east-orkney-shetland-23529871>

With regards to Graham’s discussion itself I find it difficult to understand why Neolithic masons would work the stone on site, before transporting it elsewhere. Surely the risks of damage during transport must be extremely high. I do believe this is artwork, not natural, but think it must have been intended to be seen *in situ*, on the mountain side.

Response by Graham:

I take your point about the location of the stone and as it has been under the influence of over 3,000 years of gravity its origin may be much higher up the slope. Perhaps there are the remains of a collapsed chamber scattered up above?

Abstracts:

“Morocco: a geological paradise!”

A journey through the rock record reveals an ever-changing continent on the move.

Morocco is blessed with spectacular geology that is readily accessible in a country that offers a warm welcome. From the earliest Precambrian to the present day, the geology has been influenced by multiple tectonic episodes. The oldest rocks record continent formation in the Precambrian, followed by rifting and subsidence, then a major mountain building phase during the Carboniferous (Hercynian). Another phase of rifting from the Triassic onwards is associated with the break up of the supercontinent Pangaea and formation of the Atlantic Ocean. Finally collision and uplift again, as Africa remorselessly drifts north into Europe, resulting in the Alpine orogeny and formation of the High Atlas.



The rocks record these dynamically shifting conditions and changing climate, from barren glacial wastelands to hot arid deserts, not forgetting times of warm tropical seas teeming with life that make Morocco a fossil-hunter's El Dorado.

Morocco, a land famous for Couscous and Tagine, the generous hospitality of its locals, and spectacular scenery. A geologist's paradise.

Jonathan Redfern is Professor of Petroleum Geoscience, Head of the Petroleum Geoscience and Basin Studies research and Director of the Petroleum Geoscience MScs run within the School of Earth, Atmospheric and Environmental Sciences, at the University of Manchester. He is also leader of the North Africa Research Group, funded by a consortium of international oil companies. For details of North Africa Research Group go to narg.org.uk. The talk focuses particularly upon the decade-long field geology campaign that has been undertaken by Redfern and his associates and students.

“Wales’ newest dinosaur”

The skeleton of the new Welsh dinosaur is back on display at National Museum Cardiff. The dinosaur is approximately 200 million years old, the oldest Jurassic dinosaur ever found in the UK. It belongs to the theropod group of dinosaurs and is related to *Tyrannosaurus rex*, although our dinosaur was walking the earth about 130 million years earlier than its more well known cousin. The new Welsh dinosaur is a completely new species, previously unknown to scientists, making this discovery even more exciting.

What do we know about this new Welsh dinosaur?

- It was a carnivorous predator, eating small mammals, lizards and other reptiles
- It walked on two legs and had a long tail
- It was a warm-blooded animal and much of its body was probably covered in feathery down with quills along its back
- This dinosaur died young at about 50cm tall. If it had grown to its full size, it may have been approximately 80cm tall

- It lived near the sea, in a time when the Welsh climate was more like the Mediterranean and the seas were shallow and warm

- It died close to the shoreline then its body was washed out to sea and settled on the sea bed, where it became fossilised with the marine sediment and other small creatures such as sea urchins and small fish.

The rocks containing the fossilised dinosaur bones were found on the beach at Lavernock, Vale of Glamorgan, by two brothers Rob and Nick Hanigan, in March 2014. The keen fossil hunters were out for a walk, checking over the latest rock fall from the cliffs above, when they noticed interesting shapes in the rocks and took them away for closer examination. Scientists at National Museum Cardiff were able to identify the type of dinosaur and worked with palaeontologists at other institutions, including Dr David Martill at Portsmouth University, to establish this brand new species of dinosaur, never seen before. More recently, fossilised bones from the foot of this dinosaur were found by Sam Davies in August 2015.

Book Review:

“Planet Earth in Deep Time”

Suttner, T.J., Kido, E., Konigshof, P., Waters, J.A., Davis, L. and Messner, F. (eds). “*Planet Earth in Deep Time*” (2016), Palaeozoic Series: Devonian and Carboniferous, Schweizerbart Science-Publishers, Stuttgart ISBN:978- 3-510-65335-5

It has taken me quite a considerable time to understand the nature of this book, and to identify its intended readership. At a

cost of €49.90 (€62.59 including postage) this is a book that can only appear in the Nicholls household once a year, *in lieu* of more socks and yet another cardigan.

The IGCP Project 596 “Climate change and biodiversity patterns in the Mid-Palaeozoic” was established in 2011, and has held a number of field trips, conferences and symposia, culminating in a Conference in Brussels last September. In purchasing this book I was anticipating a Summary of Research, some definitive description of the relationships between climate change and bio-diversity, and above all else a useful bibliography that would aid my research looking at the earlier (Lower Palaeozoic) events associated with the end Ordovician extinction.



This book is not that. Rather it appears to be a global field visit guide, listing in a bizarre order (more on that shortly) a rather biased account of the contributors favourite study sites. The assertion that the listing is biased is a fairly strong criticism to make of a “scientific” publication, but that it clearly is. So despite the mention of Scotland twice; in relation to a brief description of the conodont animal, and in evidence of sexual dimorphism in ptyctodonts, the only site in the UK to get a mention in the listing is Hope’s Nose, Torbay. That mention in itself reads almost apologetically for the confusion caused by the complications of the Variscan and Caledonian orogenies. No mention then of Yoredale cyclothems, of Carboniferous Marine Band Stratigraphy, of British Old Red Sandstone fossil fish, or of the early development of terrestrial vascular plants from the Brecon Beacons. So whilst the UK has only one mention (from the

eponymous Devon of course) relating to the Devonian, Latvia manages three, Argentina and Austria four each.

The layout of the book is also extremely confusing for a geologist. I would have thought that the natural thing would be to follow the stratigraphy, with the oldest sites first, and youngest toward the back. Failing that then it must be geographic surely? Americas, Europe, Asia...etc. Failing that – perhaps they have been smart and done it based on palaeogeography? Gondwana – Laurasia etc.... That not being the case what is left? Alphabetical by author perhaps? In the end it finally becomes apparent that this book is arranged in alphabetical sequence by first language of the original contributor (despite the presence of an English translation). No doubt laudable as an attempt to break down the hegemony of English in scientific literature, in this case it detracts from the science presented.

My penultimate gripe relates to the quality of the editing of the book, which I found to be sub-standard. There is an important figure on Page 11 which shows the relationship between stratigraphy, the carbon isotope record and global “events”, but unfortunately the global events have been omitted from the Carboniferous section. In a description of the Placoderms on Page 20 we are told that “internal fertilisation with live birth was confirmed in the ptyctodont *Materpisci attenbourough*, name (sic) after Sir David Attenbourough”. Given the presence of a native English speaker with a publishing background (Davies, L.) there is disappointing evidence that the original English translations of foreign texts have not been given a deep enough review, with omitted definite and indefinite articles throughout, as well as occasional spelling errors.

Finally, speaking with a hard scientific hat on, I found the photographs in the book

extremely poor. Many are presented without scale, so the many microscopic images of condodonts and forams etc look no different, to those unfamiliar with them, to the large ammonites and vertebrate skulls presented.

But perhaps it is unfair to judge the book on these terms, because as you read it, it becomes apparent that this book is not intended as a scientific introduction to the subject matter, nor as a formal text book. What this is, is a glossy, snapshot; intended more for consumption by those at UNESCO and other inter-governmental bodies with funding to hand to illustrate the global nature of geological research, and the capabilities of the earth science community to work in cross-national and cross-cultural groupings. On that level perhaps this book works. For those looking for the technical content associated with the IGCP 596 Project it is probably best tracking down the various field guides etc available on-line (just google “IGCP 596 publications”).

KHN

Reports:

NWGA Evening

Members’

Pensychnant is the ideal venue for our informal Members’ evening in December. A log fire in the drawing room together with the generous ceiling-height Christmas tree set the tone for a festive and friendly meeting.

Four varied short presentations were given, demonstrating that there is no trip too short to appreciate a spot of Geology.

Julian Bridges introduced us to his favourite rocks: Suevite and Moldavite - products of a large meteor strike in what is

now Southern Germany. SUEVITE is made up of the shattered and mixed remains of the impact later compacted to form a fine grain 'concretion' formed of a glass like material generated in the extremely high temperatures of the impact.



Figure 1: Moldavite

The 20 km diameter Ries crater can just about be made out from the top of the church tower in Nordlingen located in the crater. Massive chunks of limestone were tossed into the air to land end on can be seen at the crater rim.



Figure 2: Sub-vertically bedded limestone

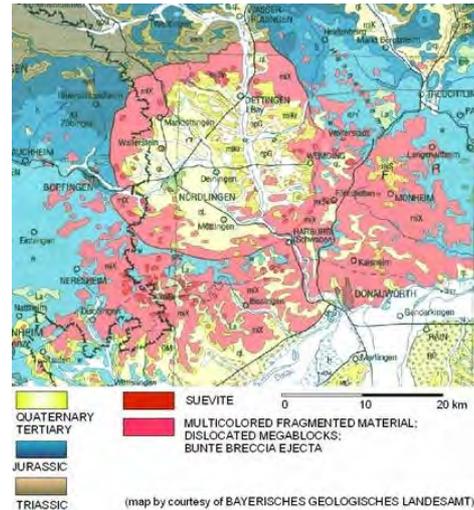


Figure 3: The Ries Crater geological map

On an altogether different scale, Cathy O'Brien brought us young Laura Murphy's rock. This has become a favourite of quite a few of us.



Figure 4: Laura's Pebble
Copyright: Cathy O'Brien

Small and unassuming this was a prized beach find from Abermenai point, Anglesey. The colouration: what causes it and why is a mystery. One of the target-like, concentrically banded areas has a central pip of quartz material. Sadly Laura has not consented to any sampling of her stone.

Gary Eisenhauer treated us to a good old fashioned and much loved slide show. With each familiar whirr / clunk of the carousel we traced his trip up the slopes on a gently puffing volcano. Setting off in sunny snowy conditions, the altitude was a bit of a problem as he climbed, but the big

disappointment was that at the top, the mist came down, and although he could smell the crater, he couldn't see it. Disappointed and with time short and legs tiring, he appreciated the guides lead as they tobogganed home.

Cathy and Julian continued the volcanism theme on Tenerife. They visit the island regularly to support the Bangor University student fieldtrip. Of interest are the lava tubes many of which can be visited. They went to visit the largest system Cueva del Viento, the fifth longest in the world (18 kilometres mapped to date). These tubes were formed 27,000 years ago in basaltic lavas from the first eruptive phase of the Pico Viejo volcano, next to Mount Teide (Tenerife, Canary Islands).

The network of galleries is arranged in three levels of conduit produced by successive eruptive stages which created overlapping flows within which the galleries formed.

The tubes can present problems for locals when the crust breaks revealing a void beneath. The morphology of the tubes provides many clues as to the viscosity and rate of flow of the lava. The features left behind are intriguing and beautiful.



Figure 5: Julian in his element
Copyright: Cathy O'Brien

The talks prompted a great deal of discussion and reminiscing amongst

the crowd over refreshments. The evening finished late but very happily.

Thanks due to Pensychnant and to Julian especially for a very hospitable welcome.

Judith Jenkins

NWGA Annual General Meeting 23rd January, 2016

Philip Firth of Lancaster University held at Pensychnant.

“Tectonics and attendant volcanism during the early Cenozoic in the British Isles – a study of the emplacement of dykes on the island of Anglesey ”

After winding up a gloriously quorate AGM, with the usual business and matters arising attended to, our Chairman Jonathan Wilkins introduced Philip Firth, explaining the way contact had been made with Philip through Jan Heiland, and setting the scene for the talk.

Philip explained the basis for his research work which, quite incredibly, took him only three months, forming the body of work presented for a Master's Degree thesis. The work undertaken involved rock sampling, sub-sampling by drilling, detailed geochemistry and Anisotropy of Magnetic Susceptibility (AMS) analysis.

The previous Newsletter gave a detailed abstract of the talk, and those wanting more technical detail are referred there. For me the intriguing and unmentioned

aspect of the Igneous Province associated with the opening of the Atlantic was the absence of anyone suggesting that this tectonism killed the dinosaurs - the earliest phases must have been coeval with, or at least hot on the heels of, Chixculub and the Deccan Traps (see St Bede's Report later).

The possibility that Philip put forward in respect of the Llanbadraig "Dyke" – that it may be an andesitic Sill – is something that the NWGA could usefully test, so watch this space in that regard for news of a Saturday or Sunday afternoon in June or July.

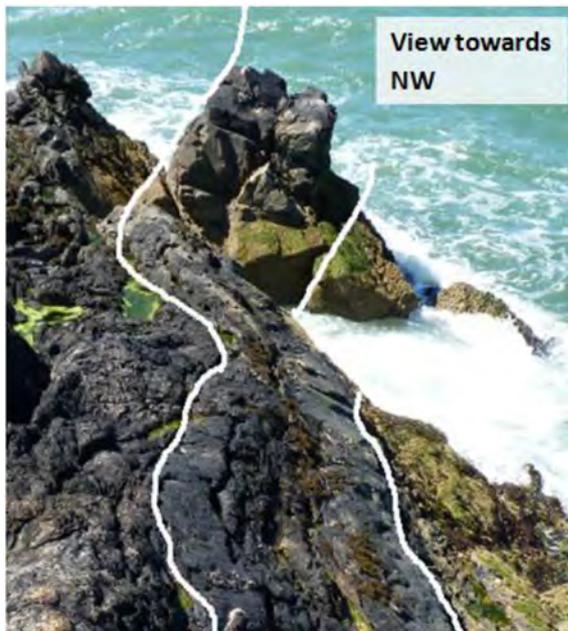


Figure 1: Llanbadraig Dyke (or is it a sill?) (Copyright P. Firth)



Figure 2: Llanbadraig Dyke – a basaltic andesite (Copyright P. Firth)

This was clearly a talk which could have been written with our Treasurer and Chairman's interests at heart. (After all the fossils, stratigraphy, sedimentology and mining of recent years two talks on igneous petrology and tectonics (graphs and all!) coming along together must have felt like heaven to Cathy and Jonathan!)

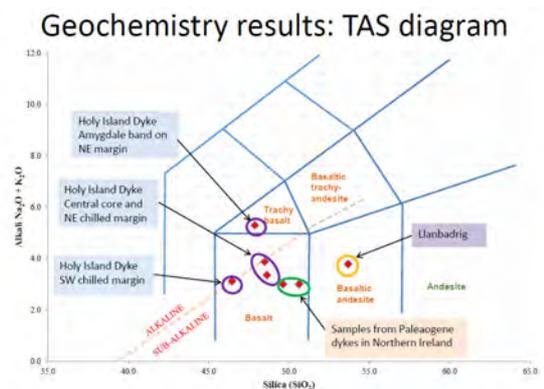


Figure 3: Total Alkali Silica (TAS) Diagram showing the compositional fields of basalt, basaltic andesite, trachy basalt, basaltic trachy-andesite and andesite (Copyright P. Firth)

Philip's talk was fully referenced throughout – and since much of the content relates directly to North Wales his references are listed in full at the rear of this report.

Following completion of the talk and a hearty vote of thanks we returned to the sitting room for more tea and coffee, before a small splinter group took advantage of the unseasonably warm and mercifully dry weather (shorts weather it would appear...) to head out onto Conwy Mountain for a convivial and extremely pleasant afternoon's walk.



Figure 4: Mynydd y Dref

Without a firm agenda in hand the conversation was both interesting and lively, with the group discussing aspects of post glacial drainage, rate of vegetation of scree slopes, Victorian collecting morals, Welsh place names, Quaternary submerged forests, Carboniferous palaeogeography, and the cost of dry stone walling; all in the spectacular scenery of Mynydd y Dref, and in the company of choughs and ponies. All in all there can be few better ways to spend a winter's day in January.



Figure 5: Panoramic view towards Conwy Valley (Copyright KHN)

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St Bede's College 19th Annual Christmas Lecture 30th November, 2015

Vincent Courtillot of Institut de Physique du Globe de Paris.

This was a wonderfully attended lecture, with a predominantly very youthful

audience, drawn from mostly (it would appear) the North West's leading public schools. It is something of a concern however to compare the audience here, with what appears to be the status offered by current Earth Science teaching within the state sector (particularly in Wales).

The talk itself was delivered by an acknowledged world expert on global mass extinctions. Vincent Courtillot's expertise is based on his research into the relationship between the eruption of the Deccan Traps, and the K/T boundary extinction. With regards to this event, the arguments are persuasive, and those that argue the case for the K/T events to be solely related to the Chicxulub Impact event appear to be fighting a rear-guard action. However, from an outsider looking in, I suspect that attempts to draw general conclusions for all extinctions, from the volcanic lessons of this one event are likely to fail, just as much as attempts to pin the blame for all extinctions on impacts fail.

Having sat in the audience at a previous conference which discussed this topic and seen the two camps of modern day catastrophists (vulcanist and impactors) going at each other ten to a dozen, both seemingly only able to agree that the absence of evidence for either associated with the Ordovician / Silurian extinction episode is the lack of any real directed effort by those working in those rocks to look hard enough, I found this lecture just a little too formulaic and predictable. This is a pity, because clearly the rocks of the Deccan Traps have an important lesson to tell, as long as we don't draw unnecessary conclusions from them, without the necessary evidence in hand.

Vincent Courtillard is not alone in seeking to draw general conclusions from specific events (be they cosmological, or volcanic in origin). As I write this review I am looking at an invitation to submit a paper

to the EGU General Assembly session SSP2.9 on Mass Extinctions, Volcanism, Impacts, and Catastrophic Environmental Changes - Observations and Processes which states:

“This session will investigate how massive volcanism and meteorite impacts may have caused mass extinctions and global environmental crises. We hope to bring together researchers across the geological, geophysical, and biological disciplines to present new and exciting research. The session will focus on the four main Mesozoic and Cenozoic crises (end-Permian, end-Triassic, end-Cretaceous, and the Paleocene-Eocene Thermal Maximum (PETM)), but contributions from theoretical studies or from other environmental crises are also welcome”.

So much then, for the second largest of the “Big 5” mass extinctions, the end-Ordovician. It has seemingly been dismissed (along with the Frasnian – Fammenian Crisis) as being too old, and therefore presumably too difficult, and is consigned to the “*other environmental crises*” pot. Cynics however might wonder if this is linked to the observation that these are the only two of the Big 5 extinction events that are not linked with volcanism or cosmology. They are however seemingly more reminiscent of changes we can see today – ocean chemistry (acidification or anoxia), climate change etc and far less likely therefore to attract research funding from the fossil fuel industry.

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Publications relevant to Wales:

Moyce, Elizabeth B.A.; Milodowski, Antoni E.; Morris, Katherine; Shaw, Samuel. (2015), “*Herbert's Quarry, South Wales: an analogue for host-rock alteration at a cementitious radioactive waste repository?*”. Mineralogical Magazine, 79 (6). 1407-1418. 10.1180/minmag.2015.079.6.16

Robins, N.S. and Davies, J. *Hydrogeology of Wales*
Free on-line report by the BGS:
http://earthwise.bgs.ac.uk/index.php/Hydrogeology_of_Wales: Summary

Dates for Your Diary:

NWGA: 2016 Spring Programme

Wednesday March 9th, 2016 (Held in association with Geoscience Wales Limited)

“Morocco: a geological paradise!”s

Speaker: Prof Jonathan Redfern, North Africa Research Group, University of Manchester. See abstract earlier in this Newsletter.

NB Change of venue from normal:

Madoc Room, Coleg Llandrillo, Rhos-on-Sea, LL28 4HZ.

Meeting to commence at 7:30PM

Wednesday April 6th, 2016

“Wales's Newest Dinosaur”

Cindy Howells, National Museum of Wales. See abstract earlier in this Newsletter

Pensychnant, Conwy, 7:00PM for tea and coffee with talks to start at 7:30PM.

Other events:

National Museum of Wales (Cardiff)

Until 28th February

Exhibition “*Reading the Rocks: the Remarkable Maps of William Smith*”

Until 31st December

Exhibition “*Wales's Newest Dinosaur*”

University of Liverpool

27th February 2016

“*Herdman Symposium 2016*”

University of Liverpool

Speakers:

Dr Andy Biggin (Liverpool) – Deep Earth Geophysics and the origin of the inner Core.

Dr Steve Brusatte (Edinburgh) – Why did the Dinosaurs go extinct? New insights into an age-old mystery.

Prof Chris Jackson (Imperial) – Terra Infirma; what is Salt and why should we care?

Dr Sue Mahony (Bristol) – Core Blimey! What drilling holes in Ocean floors can tell us about Volcanoes.

Prof Frances Wall (Exeter) – Rare Earth Ore Deposits – Carbonatites, Clays and Critical Minerals

Dr Bob Ward (LSE) – Communicating Climate Change.

There is a charge of £10 for attendance levied for those attending from outside the university – lunch is included. More information is available at:

http://payments.liv.ac.uk/browse/extra_info.asp?compid=1&modid=2&catid=38&prodid=1325

The NWGA are running a minibus along the A55 corridor (cost of £10 per person).

Please contact Jonathan Wilkins if you wish to use this option.

Manchester Geology Association

Wednesday 2 March 2016 - start time tba - Joint Meeting with the Geographical Association

“*Past Eruptions and Future Risks - should we be concerned about Iceland's volcanoes*” - Professor Fiona Tweed, Staffordshire University

Saturday 12 March 2016

“*The Broadhurst Lectures*”

This year's talks are on aspects of New Zealand tectonics – more details of the above events are available here:

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

Liverpool Geological Society

Friday 19th February

“*Footprints and sedimentology of the Formby coast*” (T.B.C.) Professor Silvia Gonzalez

Saturday 20th February

“*Field meeting to Formby*” Professor Silvia Gonzalez

Thursday 25th February

Joint Meeting with the NW Group of the Geological Society

“*Formby Oil Field and Bowland Basin*” Professor Richard Worden

GeoScience Wales (Joint with PESGB)

Thursday 18th February

“*Can we keep the lights on?*”

Energy, hydrocarbons & climate change in the 21st century”

Cymdeithas Daeareg Gogledd Cymru – North Wales Geology Association

(18:00 for 18:30), Royal Cambrian Academy, Conwy, LL32 8AN
Jonathan Craig, Senior Vice President, Exploration, Eni Upstream & Technical Services, Milan, Italy.

Geological Society of London, North West Regional Group

Thursday 3rd March
“*Prominent Female Pioneers in Geology*”
Professor Cynthia Burek
Chester University

Thursday 17th March
“*Underlands*”
Ted Nield
Manchester University

More details of the NWRG meetings available here:
<http://www.geolsoc.org.uk/nwrg>

Wrexham Museum

30th January forward
Exhibition “*Brymbo fossil forest*”
Museum Opening Times:
Monday to Friday: 10am - 5pm
Saturday: 11am - 4pm
See articles by Ray Roberts of NRW here:
<http://www.earthheritage.org.uk/download.html>

Web Site and Social Media:

Up to date information on our activities is posted regularly on the Association web site at:

<http://www.ampyx.org.uk/>

A much more informal way of keeping in touch with an eclectic mix of NWGA events, and other geological News items is available on the NWGA Facebook page at:

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

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