

Newsletter of the

# Geology Section

# Of the Leicester Literary and Philosophical Society



# January 2020

#### Editor's Notes

Welcome to the first edition of Charnia for 2020 and a Happy New Year with many interesting and productive trips. If you go somewhere exciting or interesting do think about a contribution to Charnia. Most formats of text and pictures can be processed so don't be shy! Thanks again to Roger for his latest contribution and Rob for his photos from last summer's weekend visit and some observations on the web site. See below for this year's summer attraction.

As the AGM approaches, this edition again contains a plea for volunteers to join the Committee. If you are wavering and want to know more please do talk to any Member for information.

The busy winter programme progresses and the joint lecture with the parent body will have taken place by the time this hits your post box. Also I must add congratulations to Professor Aftab Khan from Leicester University who is our speaker on Wednesday January 29th 2020 and who was awarded the Humming Bird Gold Medal for loyal and devoted service beneficial to Trinidad and Tobago on 24 September 2019.

#### Weekend summer field visit

A Weekend Field Trip this year is to Yorkshire, under the Leadership of Dr Martin Whiteley. Martin was our guide last year in the Mendip Hills, and an excellent leader he was. We plan to use a minibus, which will seat 16, to take us to spectacular scenery, and geological features in the Yorkshire Dales National Park.

An itinerary has not been drawn up as of yet, but accommodation has been booked to cater for those that have expressed their interest: bed and breakfast is reserved for eleven (11) that are in my book so far. The base site will be Malham - easy access to the Cove; Janets' Foss; and Gordale Scar, for a pre-breakfast stroll, or to work down the excellent dinners, before retiring.

Accommodation ranges from a campsite, the Youth Hostel, B & Bs, to one of the inns in the village. It is an idyllic location, and so early booking is really a necessity, so do commit now, or very soon.

#### Front cover picture

Martin Whiteley at the Druids Temple in the SSSI of the karst Banwell Bone Cave with Ron, the resident, assisting. Thousands of bones dating from the Devensian Glaciation (but not The Great Flood of Genesis), represent cold climate mammals such as great cave lion, arctic fox, reindeer and bison. Photo Rob Tripp.

## "Heads up" for the AGM.

The next AGM for the Section will take place on 25 March. Although this seems quite some time away this will be the last Charnia before the AGM, and your committee felt that we should use the opportunity to make an important appeal about the future of the Section and its activities.

For some years now we have been short of volunteers to serve on the committee and to take over some of the posts that must be filled if the Section is to continue functioning in the future. At present we are short of committee members, and we do not have a Chair of the Section, or a publicity officer. This is beginning to have an impact on the Section's activities. Members may well have noticed that instead of the usual publicity about the activities of other Sections of the Lit & Phil and the activities of other geological societies before meetings, there has been a blank. We are no longer keeping up with the activities of other Sections and other societies, nor are we able to expand our membership by publicising our activities more widely to schools and the general public.

This year for the first time we will not be able to run the seminar. Administratively we are quite capable of doing so, but without a Chair we lack the key person who organised the subcommittee that drafts the seminar programme and contacts relevant speakers to get them to commit to coming along and presenting their research and expertise to the Section. In the past we have tried to use the seminar to attract a wider attendance than just our own members, but because of the difficulty of finding someone to take on the responsibility of Chair and the lack of a publicity officer, the seminars have increasingly become attended by Section members only.

The committee has tried to adjust to the difficulty that we've experienced in getting volunteers. Some of the task that fell to the Chair to organise have been split up amongst new posts. There is now a Winter Programme secretary – currently Tom Harvey, assisted by Kieran Blacker – who organised the slate of speakers that we have for our Winter lectures. But they, together with our student representative are fully engaged in the work of the Geology Faculty in the University, and there is limited scope for them to undertake the task of getting speakers and their synopses out to you in time. So, the Winter Programme itself is under pressure and some of the speakers could only confirm at the very last minute and as a result the programme cards for this year's Winter lectures appeared late.

Other officeholders in the committee have doubled up on roles, but inevitably this means that the tasks must be fitted in to already busy personal schedules and delays and difficulties are more frequent.

The situation is becoming increasingly critical. We hope that the lack of a seminar this year will be a temporary phenomenon, but in the absence of fresh volunteers it may well become permanent. If we cannot get enough lecturers for the Winter Programme we may have to resort to less frequent meetings. One alternative would be to have more Members Evenings where members present material to the Section, but even here we are experiencing difficulties as the lack of articles being submitted for publication in Charnia shows, and the difficulty of getting members to present at Members Evenings also demonstrates.

So, this AGM is going to be a significant one. We desperately need volunteers to come and serve on the committee. If we had a good flow of volunteers then, after a year or so seeing how the Section is run, we might get a steady flow of people prepared to take on administrative roles. However, it is becoming critical that we find someone with a geological background – either through educational or practical experience – who is prepared to take on the role of Chair of the Section. We also need someone to take on the role of publicity officer and re-establish connections with external bodies, other societies, and the public. Enthusiasm is the key requirement here.

We are fortunate that when our previous Secretary, Fiona, retired recently after many years of service that Gavin was prepared to step forward and take over the very new role for him as Secretary. However, the Section remains vulnerable to external circumstances where important players on the committee move away or personal circumstances mean that they can no longer fulfil the roles that they did. If this were to happen, and it might, the Section would find itself in difficulties that might threaten its future activities, or even its closure.

We believe that members of the Section value its activities and in the past, we have been an outstanding example of the tradition of geology where the professional and enthusiastic amateur can still enjoy the contribution that each makes to our understanding of the Earth. If members wish to see this continue, then we hope that you will be able to respond to this appeal at the next AGM.

If you want to find out more do get in touch with any member of the Committee either at a meeting or by e-mail or telephone.

Roger Latham. Treasurer and Vice Chair.

## Summer weekend visit 2019 to the Mendips

#### Pictures from Rob Tripp with highlights from last summer



Whatley Quarry is one of the two 'super quarries' on east Mendip and extracts rock from almost all of the sequence of steeply dipping (65<sup>o</sup>–80<sup>o</sup> N) Carboniferous Limestone on the northern limb of the Beacon Hill Pericline. This view is of the middle third!



Leader Martin Whiteley at the The De la Beche angular unconformity at Vallis Vale, in the Mendips Uppermost is the yellow-coloured, horizontally-bedded Jurassic Inferior Oolite limestone overlying grey, massively-bedded and steeply-dipping Carboniferous Vallis Limestone.



Whatley Quarry view point



Looking over Moons Hill Quarry. This Silurian andesite in the Beacon Hill Pericline was unnoticed in the surrounding, resistant, ORS and Carboniferous Limestone strata, until early 1860s. Four major flows are terrestrial, but towards the top of the succession, pillows are present.



We visited the Somerset Earth Science Centre, which is colocated by Moons Hill Quarry.



Most of the Crew in Burrington Combe (after the rain had passed). This is a typical Mendip gorge, established in the western-most Mendip pericline, and provides a well exposed, easily accessible, section through the Carboniferous Limestone sequence.



On the north and east side of the gorge, with the Black Rock Subgroup limestones. Across the road is the Rock of Ages - overlying Burrington Oolite forms this crag which has given its' name to the hymn by Rev Toplady.





The Cotswold Oathill Quarry in ovoidal limestones of the Birdlip Formation , overlain by the Scottsqar Member, and the sandstone of the Harford Member beneath the limestones of Ashton Limestone Formation and Notgrove Member.

## Fishy Tale.

The Northern Isles are difficult to get to by overland means. Orkney and Shetland are at least a day and a half's journey from most places in England. The ferry times from Aberdeen see to that, as we found out on a recent trip to see the archaeology of both. Although more than often they are lumped together in travel brochures, geologically speaking they are very different. The Shetland Isles are long and linear the result of extensive north-south faulting of crystalline igneous basement rocks, with associated metamorphism. Such sedimentary rocks as exist are confined to the periphery of the islands. They give a bleak and unforgiving landscape.

Orkney by comparison has a much softer contour of low rolling hills, comprised substantially of almost horizontally bedded Devonian sandstones with the occasional bit of metamorphic rock peeking through. The sandstones in Orkney were often associated with lagoonal conditions set in a wider sea.



**Near Gurness Broch** 

The sandstones and flagstones – of which much of the archaeology is built, being so easily split into handy rectangular blocks – show the signs of some 20 episodes of sea transgression and recession which have left a variety of structures embedded from shallow water ripple marks through to stromatolites and deeper water deposition.

Being the Devonian, it is the age of fish. But extensive though the Devonian sandstones are in Orkney, there is only one bed – the Sandwick fish bed – where fossilised fish are abundant. This is a thin layer of dark grey mudstone that represents a lagoonal anoxic environment into which the fish died and were left undisturbed by predators. The siltstones of the Sandwick fish bed were quarried for roofing slates in the past, but only one quarry is now working at Quoyloo. And knowing that the formation is full of fossils in certain beds, the quarryman makes a good side profit in selling examples to the tourists – including me (see below).





But Orkney does have some surprising discoveries for anyone interested in palaeontology. At the end of Scapa Flow there is a small café at Burray, which does a passable light lunch. However, attached to it is the Fossil and Heritage Centre and whilst it has some interesting bygones of life in Orkney in past years it also has an amazing collection of Devonian fish – one of the most extensive collections I've ever seen. So, if you are in Orkney it's well worth a visit.

**Roger Latham** 

**Editor's note:** For those heading north, Logan Air has introduced flights from East Midlands Airport to Scotland including Inverness. It is then be possible to transfer to flights to Orkney and Shetland. This saves travel time although at the expense of your carbon footprint.

#### The CHARNIA Website

I occasionally share the analytical data from the website with the other Members of our Committee. Our website is part of the outreach that is required of a Charity to the broader public, but the traffic of requests to the Site does raise in us some humour and curiosity. So, here, we share with you some of the gems that are presented.

The website is hosted by a British ISP based in London; and the program on which it is written, RapidWeaver, is also British. However, in minimising cost, we use an American-based entity with a .uk address to provide us with the secure https:// precursor, (or SSL Certificate) that compliance with the General Data Protection Regulations (GDPR) has required since last year. This arrangement saves us many hundreds of pounds sterling in website charges; and I do mean many! Despite our signal going across the pond and back, the first sight that you will have of our webpage will be in one (1) second if you use a desktop, or less than four (4) seconds on 3G mobile. The complete website is loaded to your desktop in seven seconds and that includes all the Charnia newsletters and photographs!

Where the traffic to our site originates arouses some curiosity. During the month of December the total traffic was from:

USA - 8111 PRC - 2083 Netherlands - 1549 UK - 1299 Others - 8184.

'Why the Netherlands?' you may ask. Obviously the States and China are both very populous, and a higher hit rate would be expected. High amongst the Others are Canada and Singapore. Daily requests of the top three number well over 250 while Singapore and Malaysia call over 100 times per day. The Antipodies seem to not have an interest at all; on occasion that I have looked at the analytics, I have not seen a count from the POMs; South America is represented by a handful in Brazil, while Africa and the Middle East do not paint.

The Europeans that peruse our site, beside the Netherlands, are ranked thus:

Hungary (>65); Iceland and Latvia; Lithuania; Romania; Denmark (>30): France and Germany both call in the mid/high teens, while neither Russia or India call in more than 10 times per day.

Some traffic is opportunistic of course, but the total requests usually exceed 1000 per day, of which some 700 are cached requests, that is, they are returning visitors. The routing that delivers some visitors (some of the uncached ones) to Charnia is the really humorous part - they are directed in from pornography sites. We all have our interests, don't we?

Rob Tripp

#### Abstracts from 2019/20 winter meetings

Wednesday October 2<sup>nd</sup> 2019: Wind turbines and woolly mammoths: the past, present and future of Dogger Bank.

Kieran Blacker (University of Leicester).

In the vast Venn diagram of applied geoscience, there is the sub-discipline of offshore site-investigation and foundation design. Whether the task at hand is siting a drilling rig or platform, or placing large permanent structures such as the foundations for wind turbines, the first step is an adequate site investigation. In the first half of this talk, we will find out how to pick the right location to site a wind turbine, using data from the Dogger Bank located in the Central North Sea. What are the geological conditions at the seabed and in the sediments below? Are there any shallow hazards, such as gas pockets or a risk of slope failure? There may even be an archaeological discovery, unexploded ordinance, or woolly mammoth remains!

The second half of the talk will demonstrate how geoscientists can use this dataset to uncover the vast buried landscape of Doggerland. We will learn how the physical properties of the seabed and subsurface tell a fascinating story of a dynamic, constantly evolving landscape carved and shaped by multiple large-scale glaciations. Some of your ancestors may have even lived, hunted and died on Doggerland, a place which has been referred to as the Mesolithic's "prime European real-estate" (National Geographic, 2012). From 100,000 years ago to the present, we'll journey from frozen tundra to the drowning of this prehistoric landscape.

Wednesday October 16<sup>th</sup> 2019: Fissures along faults: formation, fill and importance.

Dr Nigel Woodcock (University of Cambridge).

A persistent popular fear in seismically-active areas is that fissures will open up along earthquake faults and will swallow people up. This fear is not irrational, because surface fissures certainly form along the right sorts of faults. But how wide and deep are these fissures and do they also develop at depth along faults? If so, can they be recognised either on active faults or in the geological record?

This talk will examine some UK evidence for ancient open fault fissures. These examples are all hosted in Carboniferous limestone, but from three different areas: the Gower and Pembroke peninsulas in South Wales, and along the Dent Fault in Cumbria. We will look at how open fissures – essentially fault controlled caves – form and fill up through time with breccia, finer sediment or vein growth. We will also find that fault fissures are more than just a local curiosity but are potentially important in controlling fluid flow through the upper crust.

#### Wednesday October 30<sup>th</sup> 2019: Skinning the pterosaur.

Dr Dave Unwin (University of Leicester).

Pterosaurs were the most diverse, widespread and ecologically important group of vertebrate fliers throughout the Mesozoic. Despite more than two centuries of research many key aspects of their biology remain uncertain. We can, however, be confident that the pterosaur integument played critical roles in flight, physiology (e.g. control of temperature, water loss) and protection from the external environment (physical injury, diseases). It is also likely that it was involved in display and cryptic colouration. Consequently, a detailed understanding the structure and function of the skin could provide fresh insights into pterosaur biology. This talk will present, for the first time, a new model for the pterosaur integument, founded on a suite of fossils

from South America, Europe, Middle Asia and China in which remains of the skin are exceptionally well preserved. Pterosaurs did not have hair (or feathers) as currently supposed and took advantage of a unique and highly versatile structural system based on collagen fibre bundles that supported a range of integumentary structures including wing membranes, cranial crests, tail flaps and foot webs.

Wednesday November 13<sup>th</sup> 2019: Low permeability rocks and their use as barriers to flow in the subsurface.

Dr Katherine Daniels (British Geological Survey, Keyworth).

The Climate Change Act (2008) put the UK on a path towards a significant and ambitious reduction in carbon emissions by 2050, a target that the country has been working towards for the last decade. Earlier this year, the UK then pushed the climate agenda further by becoming the first major economy to pass a net-zero emissions law. These commitments to emissions reductions will require a dramatic shift in the way the country generates and uses energy. Renewable energies such as wind and solar, are capable of providing much of the energy to meet our needs, but these technologies suffer from intermittent generation patterns, often resulting in a mismatch between supply and demand. Geological energy storage is a viable and large scale method of retaining this green energy produced when supply outstrips demand, and this energy can then be tapped when demand is high. In this talk I will present the geological options for energy storage and discuss some of the challenges that need to be overcome in order for us to see a widespread deployment of this vital technology.

#### Wednesday November 27<sup>th</sup> 2019: Carrara marble - the world's finest decorative stone.

Dr Mark Barron (British Geological Survey, Keyworth).

Marble is an exceptional material, and I talk about its formation, distribution, abundance and varieties including British marble, its extraordinary properties and its diverse usage. Carrara marble is pre-eminent, and its story has enduring fascination - commencing in a now-vanished ocean occluded by continental collision and orogenesis, moving on to over 2000 years of history including extraordinary human endeavour, fascinating engineering, megalomaniac popes, heaps of money, and culminating in nudity, albeit as some of the world's greatest art made from its finest natural material.

**Wednesday January 15<sup>th</sup> 2020:** Hothouse climates: What can mud from the bottom of the ocean tell us about past high-CO2 worlds?

Dr Kirsty Edgar (University of Birmingham).

Projected partial pressures of atmospheric carbon dioxide (pCO2) for the coming century have not been seen on Earth since the Eocene, more than 34 million years ago (Ma). In the Eocene, the Earth was much warmer than today with heat-loving organisms such as turtles, crocodiles and palm trees in the Arctic, and host to small or no ice sheets. Thus, the study of past warm intervals in the geological record can provide us with critical insights into how the Earth system looks and works in a high pCO2 state. Questions that we can address include – How quickly can ice sheets grow and decay? How do marine organisms respond to rapid changes in ocean temperature and pH? How good are our current predictive climate models? Arguably, the most important climate archives that we have to help answer these questions is the deep-sea sediment recovered by the International Ocean Discovery Program (IODP) and its predecessors, which span the past 200 million years of Earth history.

#### Remaining winter programme for 2020

**Monday January 27<sup>th</sup> 2020:** Fire and fury in Iceland: tracking molten rock from deep in the Earth to eruption at the surface. *Joint Lecture with the Parent Body, New Walk Museum, Leicester.* 

Professor Robert White FRS (Bullard Laboratories, University of Cambridge).

Wednesday January 29<sup>th</sup> 2020: Geophysics, Leicester and I.

Prof. Aftab Khan HBM (University of Leicester).

Wednesday February 12<sup>th</sup> 2020: Members' Evening, New Walk Museum, Leicester.

Wednesday February 26<sup>th</sup> 2020: Climate records from corals.

Prof. Jens Zinke (University of Leicester).

Wednesday March 11<sup>th</sup> 2020: Fertile ground for mobile phones.

Dr Eva Marquis (University of Leicester).

Wednesday March 25<sup>th</sup> 2020: Annual General Meeting and Chairman's address.

All lectures in the usual venue – Ken Edwards Building, Leicester University. Note that the members' evening on 12<sup>th</sup> February is at the New walk Museum.

## SECTION C COMMITTEE 2019-2020

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