CHARNIA

Newsletter of the

Geology Section

Of the Leicester Literary & Philosophical Society

February 2019

EDITOR'S NOTES

This edition of Charnia is timed for the Section AGM on 27th March 2019. Key items for discussion are the future of "Charnia" and its impact on subscriptions and encouraging new members for the Committee. More detail on both of these items is on the next page with an article from Roger Latham.

From my perspective, Charnia needs contributions if it is to be more than an up-to-date programme of events or record of recent talks. I do not aim to produce peer reviewed articles but to encourage contributions about member's trips or personal researches, thoughts on recent talks or ideas for discussion. Maybe there is a place for a letters page with members' ideas for future lectures or topics for seminars and visits. With this in mind, a big thank you to June Gray for her article later on.

The newsletter is produced in multiples of 4 pages. If we continue with a posted hard copy, the current cost for 8 pages is £1.23p per copy delivered; 12 pages cost £1.48 per copy, 16 pages £1.63. The marginal cost of increasing the size is modest. But, even if the AGM decides to go electronic, more items would be welcome.

If you have any ideas or contributions please let me know at bdh2o@hotmail.co.uk.

The cover photo is of cleavage and kink bands in the Ediacaran South Stack Formation to the south of Rhoscolyn Head, Holy Island. Schistose greywackes taken by Rob Tripp, on an earlier summer field visit. The initial programme for this year is on page 7.

Big Issues for the AGM.

Very shortly you will be getting notification of the date of the AGM and a request for nominations for the new committee. The "On the Rocks" update in the last edition of Charnia mentioned an issue that needed to be decided at the AGM, and the letter that you received from Mark and me about the difficulty in filling roles for the Section will mean that this AGM is particularly important. For that reason, the existing committee thought it would be worthwhile setting out here in advance the two issues which will make this more than just the usual stuff that we deal with at the AGM.

- The first issue concerns the future publication of Charnia and the subscription level. Put simply the cost of printing Charnia is rising all the time, and if it is the wish of members to continue to receive a printed copy as you do at present then the normal level of subscription will have to rise from £10 up to £15 with the other membership categories increasing proportionately. The current subscription can only be maintained if members decide that Charnia will in future be distributed electronically, with a photocopied black and white version for the small minority of members who are unable to receive it in this way.

- The second issue concerns the composition of the new committee and some key roles that need to be filled. It needs to be said that no one is suggesting that a new volunteer to go on the committee would immediately be plunged into one of the major roles that are necessary to keep the Section running. What is needed are new members who are prepared to serve as committee members and "learn the ropes" of some of the bigger jobs so that over a period of time we have an assurance of continuity. That said, although the committee will try its very best to fulfil roles, in practice we know that we have two big gaps at present. One is for someone to take responsibility for our publicity, as the current committee member is moving away from the area and therefore is no longer able to serve in this role. The second is the need to find someone with a geological academic background – however long in the tooth that might be – to serve as Chairman which will allow Mark to step down from the role which he has occupied for a significant number of years and which he may not be able to do so in the future owing to changing personal circumstances.

So, when you get notice of the AGM, and the request to submit nominations please consider our situation carefully so that the AGM we can ensure the smooth and efficient running of the section in the future.

One bit of good news though is that, after representations by the committee, Leicester City Council have decided to reverse their proposed policy to charge for the use of accommodation at the New Walk Museum. Final discussions are still ongoing, but it looks like we will be able to revert to our normal practice of holding the Members Evening and the Christmas meeting at the Museum in future.

Roger Latham
Vice Chairman and Treasurer.

Naive reflections of a non-geologist on holiday

Spurred on by the possibly imminent demise of not only the Charnia Newsletter but maybe even the Society itself, I sat down (that's my version of being 'spurred on' by the way) to consider what I might do to help prevent the former. An article seemed the best route, so here is my contribution. As regards the latter issue, I'm more than happy to pay double the current subscription as I think that £10 for 10 lectures is more than just a bargain, it's virtually a freebie! My ability to understand most of the lectures is neither here nor there but I'm sure that, if members think about it, £1 a lecture is a little too little, if you follow me.

Anyway, as is often the case, I've got diverted from the main object so, back to my story about how a non-geologist got her first truly fascinating encounter with geology - in Canada! Now, discovering rocks and stuff was not the object of the journey. It was in fact a trip with my husband to celebrate our joint silver wedding anniversaries with our best friends from the Duncan of Jordanstone College of Art in Dundee (that equates to two town planners and an artist and a Dundee University joint honours graduate in English and Philosophy). One planner and the artist emigrated to Calgary two years after our common wedding days so it had been over 20 years since we'd seen them. And this all happened back in 1995!

So, the holiday. Obviously I bagged the window seat for the flight from Heathrow and enjoyed the best views ever through the whole journey. Cloudless skies all the way and the landscape of geology laid out just for me far below. I loved the fact that the OS maps are right about the wiggly bits along the west of Scotland, that the vast expanse of the Canadian Shield reflected (via school Geography lessons) the effects of severe glaciation with millions of lakes, streams and rivers -

and no signs of habitation for the 2-3 hours it took to fly across it. Then the sharp, snow-covered crumples of the Rockies that I know are the signs of a young mountain range. But I had never truly seen 'proper' mountains before (if you ignore the Alps which were traversed either in fog or through the St Bernard tunnel), so banking down to Vancouver through gaps in the Rockies and the Coast Mountains was an incredible, if somewhat frightening, experience.

After a week in Vancouver, including a ferry trip through the island-dotted Straits (fjords?) to Vancouver Island, we headed by coach up through the Frazer River canyon - great sheets of rock and scree - on the Trans-Canada Highway which quickly rose upwards to the deep gorge at Hell's Gate. Here the power of the water has cut down through the rocks as the mountains have risen upwards, so the information board explained anyway. Finding hummingbirds feeding outside the restaurant on the Gate's north side (scary cable car ride down from the roadside parking area) was an ornithological bonus. After a huge lunch of fresh salmon salad it was onwards and upwards through the Thompson Canyon where erosion of the pre-glacial floor has cut through the solid rock and the only space for the highway and the transcontinental railway is a precarious narrow ledge hacked out of the vast walls of rock. Next onto the Thompson Plateau with its arable farms and acres of ginseng fields (!). An overnight stop at Lac le Jeune amid pine trees and the most deafening silence ever, we moved upwards into the snow line (this is May remember); and now the sedimentary layers forming the mountains are evident as they are picked out by bands of snow. Another overnight at frozen Lake Louise, still partly snowed in, with its Crowfoot Glacier hanging high above.

Then, the Icefield Parkway, towered over by mountains and showing the scars of old avalanches that tore through the

forested slopes. The highlight of the day was the Athabaska Glacier - with its terminal and lateral moraines and crevasses. So we did the Sno-coach thing on the big tracked vehicles and tramped about on the snow for a bit, all the while hoping to hear that 'glacier creak' or even one of the frequent avalanches everyone tells you about. No luck though. However, global warming was evident in the distance the glacier had retreated over the past few years, which was a bit of a downer. Onward again, still with blue skies and more snowy mountains than you can shake a stick at (or even a mountain goat at), viewing the power of the river cutting the rocks in Maligne Canyon to Banff, with its many rock shops - loads of fossils and semi-precious stones, all polished or made up into jewellery. Took in the Athabaska Falls, the impressive step that is Bow Falls and the rock-topped spires of the Hoodoos (more involuntary geology) as well as cablecar number 3 to the top of Sulphur Mountain for spectacular views.

Out of the mountains the next day onto prairie Canada. A school holiday in Calgary meant a special trip with our friends and their kids to the Royal Tyrell Museum in Drumheller, built low down in one of the well-eroded and designed to reflect the horizontal stratigraphy of this part of the prairies. This is a must-see fossils fiends - all the dinosaurs that any kid could possibly wish for and some adults too, by the way! Plus the black line in Horse Thief Canyon that records their mass extinction.

And that seems a suitable place to stop as the rest of our stay was eating, catching up and alcohol in Canadian sized measures. This fun piece can in no way compete with Roger's more informed article with similar references in November's Charnia but I hope you have enjoyed an amateur's view.

Our Canada trip was nonetheless a holiday overloaded with geological sights and fossils as well as being a timely reminder that, if global warming doesn't get you, then there's a big monster rock out there somewhere probably heading our way!

June Gray

Summer Programme

Saturday 18th May: Blockley Quarry, home to Northcotbrick Ltd. By kind permission of Mr Dale Moss, Manager.
Charmouth Mudstone Formation of the Lias Group, Jurassic Sinemurian-Pliensbachian Age: 183-199Ma

Summer weekend trip

Friday to Sunday, 14th-16th June: **The Mendips**

The Leader will be Dr Martin Whiteley, recently of The University of Derby. Strata range from the Silurian Coalbrookdale Formation, through Devonian and Carboniferous, to the Jurassic and Triassic
Those attending will make their own transport arrangement to and from the accommodation.
The Leader will provide a minibus to carry attendees during the two days of investigation.
The visit to the Banwell Bone Cave (in private grounds) will be at cost. Expressions of interest and intention are required as soon as possible to enable booking. Please contact rob.n@newford.u-net.com

Abstracts from 2018/19 winter meetings

November 28th 2018: Reconstructing Holocene oceanography around the sub-Antarctic island of South Georgia.

Dr Rowan Dejardin,University of Nottingham.

South Georgia is located in the path of the Antarctic Circumpolar Current (ACC) and the Southern Hemisphere Westerly Winds (SWW), south of the Antarctic Polar Front (APF) and surrounded by an anticyclonic loop of the Southern ACC Front (SACCF). The waters surrounding South Georgia are highly productive and variability in the interaction of the SACCF with the island may impact productivity on the shelf. Of wider significance is the large phytoplankton bloom that occurs to the north-west of South Georgia, where the SACCF retroflects to return to its cyclonic circumpolar circulation. This bloom represents one of the largest seasonal sinks of atmospheric CO2 in the Southern Ocean. Given the likely importance of the Southern Ocean as a carbon sink/source during the transition between glacial and interglacial periods a better understanding of the bloom dynamics could be important to our assessment of the Southern Ocean's role in these transitions.

This presentation will discuss new multi-proxy palaeoceanographic records of sea-surface temperature and productivity from the South Georgia shelf and their implications for our understanding of the climatic history of this area over the past ca. 15000 years. The palaeoceanographic records presented support the hypothesis that the ice sheet on South Georgia during the Last Glacial Maximum extended onto the shelf. Potential evidence for the formation of a calving bay re-entrant over Royal Bay trough indicates that grounded ice may have been present on the shallower shelf until ca. 15 cal. kyr BP, having retreated rapidly over the deeper cross shelf troughs after the

Last Glacial Maximum. During the Holocene, I propose that both sea-surface temperature (SST) and shelf productivity may have been driven by variation in the SWW, except during the early Holocene when sea-ice proximity may play an important role in productivity variability. Changes in the intensity of the SWW at South Georgia drive SST through their impact of local foehn wind frequency and shelf productivity through variation in coastal upwelling. This interpretation of the variability in shelf SST and productivity indicates that the SWW were more intense at South Georgia during the mid-Holocene, and weaker during the early and late Holocene.

January 16th 2019: The Shap Granite: a Lake District conundrum.

Dr Andrew Miles, University of Leicester.

Granites, and in particular the British Caledonian granites, have shaped our understanding of crustal processes since the seminal work of James Hutton. Our understanding of granite formation has of course evolved significantly over the past 250 years, and in particular since the ground-breaking experimental work of Tuttle and Bowen in 1958 that confirmed that all granites must pass through a magmatic stage. Recent advances in high precision zircon geochronology now suggest that many batholiths represent long-lived, trans-crustal mushes that spend much of their history with no, or minimal, volumes of interstitial melt. In this talk, and with a particular focus on the Shap granite (Lake District), I will explore how recent advances in analytical techniques have changed our understanding of how and why Caledonian magmatism occurred, how it interacted with regional tectonics and how the combination of different high precision dating techniques can provide an unrivalled insight into the protracted histories of granite batholiths.

January 30th 2019: Rivers in the rock record: from Utah to Wales.

Dr Catherine Russell, University of Leicester.

River deposits form an important component of the sedimentary rock record. They are crucial for the interpretation of ancient environments, climatic regimes, and long-term patterns in weathering and erosion. However, we know that modern river deposits can be extremely complex in their architecture, which is not demonstrated in classic geological models. This complexity is due to the ways that meandering rivers change on both short and long timescales due to climate changes, oxbow lake formation, and other factors. It is particularly challenging to interpret the shape of meandering rivers from vertical exposures of rock successions. How can we reconstruct the complex “plan-view” shapes of rivers, when we usually only see vertical stacks of sediment exposed in rock faces? Furthermore, within the river deposits, we need to understand where mud and sand is distributed so that we can correctly interpret seismic profiles, and predict the likely distribution of petroleum resources. Here, I will present quantitative data collected from modern rivers with markedly differing morphologies has been enabled by the development of a robust, novel methodology for more accurately interpreting the rock record. Measurements of 35 morphometric parameters of 200 active meander bends from 13 different rivers were acquired using Google Earth Pro. An ancient point-bar deposit, from the Pennsylvanian in Wales, served as a test data set for accurate reconstruction of meander morphology. The work has found that the novel methodologies utilised in this study can enable meandering rivers to be more accurately interpreted from our fragmented geologic record.

Leicester Literary and Philosophical Society, Section C (Geology)
Remaining Winter Programme, 2018-2019

All held at 7.30pm in Lecture Theatre 3, Ken Edwards Building, on the main University of Leicester campus, except where stated otherwise. Refreshments served from 7.00pm.
Details: Chairman Mark Evans, mark.evans@leicester.gov.uk, 0116 454 0231

11Wednesday February 13th
Members' Evening, New Walk Museum, Leicester - confirmed.

Wednesday February 27th
Jordan Bestwick (University of Leicester). **Reconstructing diets of pterosaurs and other extinct animals – problems and solutions using dental microwear textural analysis.**

Wednesday March 13th
Dr Joe Emmings (British Geological Survey). **Precursor to UK Pennsylvanian Coals: Exploring Biogeochemical Processes in the Late Mississippian Rheic-Tethys Seaway.**

Wednesday March 27th
Annual General Meeting and Chairman's Address by Dr Mark Evans. **The Mesozoic Marine Reptile Renaissance: Part 3. Thalattosuchians, the Mesozoic marine 'crocodiles'.**

Saturday Seminar: Geology under the Sea.

9th March 2019
Bennet Link Lecture Theatre, Leicester University.

Programme:

Professor Sarah Davies, University of Leicester: Introduction.

Professor Mike Lovell, University of Leicester: Some history.

Professor Bridget Wade, University College London: Reconstructing paleoclimates and environments through shipboard geology.

Dr Chris Little, University of Leeds: The fossil record of deep sea hydrothermal vents and cold seep environments.

Dr Rebecca Bell, Imperial College London: Seismology: New Zealand expeditions on land and at sea.

Dr Steve Rippington, Astute Geoscience Ltd.: Resources under the sea.

In addition, there will be demonstrations of replica drill-cores and core-logging equipment in the lunch break, courtesy of IODP.

Tickets £17.50 from Roger Latham:
roger.86latham@btinternet.com or at indoor meetings.