

# CHARNIA

Newsletter of the

## Geology Section

Of the Leicester Literary & Philosophical Society



November 2018

## EDITOR'S NOTES

You should have received a letter from Mark and Roger earlier this month about the difficulties with producing Charnia. This edition has been produced as an interim. Roger included a request for comments on the future means of production and circulation in the May edition ("On the rocks?") and a summary of the responses received has been included on page 3. The idea is to put the options to the AGM next year. The same AGM will have to address the other issues raised in the letter concerning involving more members in running the Section.

You may have heard that, despite the long association with the Lit. and Phil., the Museum is introducing charges for the use of its rooms. The Section Committee has decided that we do not wish to pay these so please note that the Christmas Members' Meeting on the 12<sup>th</sup> December will be at the University in the usual venue.

Please also note the date for the Annual Seminar on 9<sup>th</sup> March 2019 when the topic will be Geology under the sea.

It is hoped to produce an edition of Charnia early in the New Year prior to the AGM so please send any contributions to [bdh2o@hotmail.co.uk](mailto:bdh2o@hotmail.co.uk).

The cover picture is from John Smellie's lecture on Volcanism in Antarctica

## Charnia article – “on the rocks” update.

Roger Latham, Section C Treasurer

The last copy of Charnia I wrote setting out a few options for distributing Charnia in the future, given the significant increase in printing costs that we were facing. I also asked for members to comment on the annual seminar to help give the committee a handle on the reasons for the declining attendance over the last few years, which has had an impact on our finances.

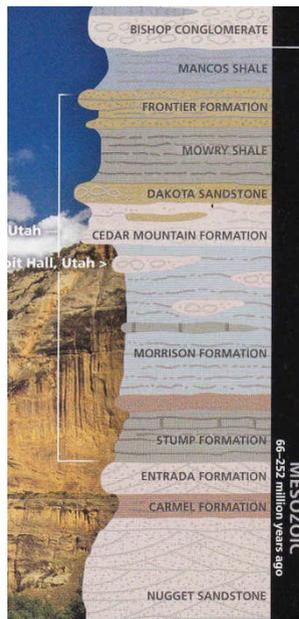
Can I take this opportunity to thank all those members who wrote to me and sent emails setting out their thoughts sometimes in quite a lot of detail? The committee considered the responses that have been made at the last committee meeting. We decided, based on your responses, that there are two options which we should put in front of you at the next AGM. One will be to distribute Charnia electronically in future and provide a photocopied version for the small minority of members who aren't connected to the Internet. The other will be to continue with the printed version as at present, but to increase the basic subscription from £10 to £15 annually to pay for the increased costs. It will then be up to members at the AGM to decide which of these options they prefer.

On the question of the seminar we got some very diverse views about the subject matter, timing, and why some members had been unable to attend in previous years. What did come across very strongly however was a wish to see the seminars continue. The committee is currently planning next year's seminar in the light of this support, and hope that will be more strongly supported by our membership.

# Morrison.

Roger Latham

No – not the supermarket – but the Morrison Formation named after little town of Morrison in Colorado USA. The Formation consists of strata of sandstones, limestones, and siltstones that were formerly laid down in the Morrison Basin in the Upper Jurassic Kimmeridgian period. Laurasia had just split away from Gondwanaland and the Morrison Basin covered a vast area now stretching from New Mexico up through Canada into Saskatchewan. Most of the Formation is still buried under the later deposits on the Prairies and High Chaparral, but it is exposed particularly in Wyoming and in Colorado. I had the pleasure of making its acquaintance on a road trip to the western USA in 2016.



The Western States and the USGS have got a very good policy of marking the changes of geology along the roadside so you can identify the changed strata and the dates of deposition. Perhaps the Highways Agency and BGS could cooperate and do this in the UK!

The Morrison Formation is particularly well known in palaeontological history as the site of the “Bone Wars” between Othniel Marsh and Edward Drinker Cope as the Formation in places is stuffed full of dinosaur bones – mostly of sauropods of a bewildering variety, but also the occasional theropod predator. My close encounter with

the Morrison Formation came when we visited the Dinosaur National Monument in the Uinta Mountains in Utah. The National Monument is based in a river basin in a denuded anticline and the rocks of the stratigraphic column stand nearly vertically, so that a short walk can rapidly take you through a long stretch of geological time.



But undoubtedly the star in this walk through time is the Morrison Formation, where the dis-articulated skeletons of sauropod dinosaurs are abundant. A brief walk along the upturned face of the Formation reveals bone after bone, and not just fragments either. It is the most impressive bone bed that I have ever seen. The general feeling is that the collection of

bones at this point is such a jumble that it represents a collection of sandbars on a braided stream which the bodies of dinosaurs were swept down by occasional violent storms and deposited as a great heap. Predators are relatively few, probably indicating that they feasted on the carcasses and that only a sudden catastrophic event result in them being included in the bony masses of their meal.

**Photo: Dinosaur Bone, Morrison Trail**

## **Abstracts from 2018 winter meetings**

**October 3<sup>rd</sup> 2018:** Food for thought: functional trends in the dinosaur feeding apparatus and the roles of convergence and contingency in dietary evolution. Dr David Button, Natural History Museum, London.

The relationships between form, function and ecology are crucial components of evolutionary biology. Data from the fossil record is critical here, through providing our only perspective on morphofunctional and ecological trends across macroevolutionary timescales.

Mesozoic dinosaurs exhibited great plasticity in ecology, with repeated origination of specialised diets. In particular, although ancestrally carnivorous, herbivory evolved multiple times independently within the clade. This provides an ideal case-study in which to investigate signals associated with the evolution of specialised ecologies. However, whereas behaviour and performance can be readily observed in living taxa, extracting these data from fossil specimens requires a sophisticated methodological toolbox.

Here, a suite of visualisation and biomechanical methods is used to reconstruct the feeding apparatus of Mesozoic dinosaurs, and investigate functional trends associated with dietary evolution. Results show that the evolution of gigantism was associated with dietary innovation within Sauropodomorpha, highlighting the importance of feeding behaviour in driving the diversification of dinosaur body plans via correlated evolution of characters.

Comparison of clades reveals that pathways to herbivory were reveals repeated functional trends observed between them.

Significant evidence of evolutionary convergence is observed between two subsets of taxa. However, multiple solutions to herbivory are still observed within Dinosauria. Although convergence within subsets of taxa is common, it is not observed between them due to functional constraints imposed during the early evolution of each group. This highlights the hierarchical nature of evolution, with adaptation driving convergence within regions of morphospace delimited by phylogenetic contingency.

**October 17<sup>th</sup> 2018:** Minerals of the English Midlands. Roy Starkey.

The mineral wealth of the English Midlands has been exploited for centuries – lead, copper, zinc, and to a lesser extent silver, have all been worked. Deposits of coal, iron ore and limestone powered the Industrial Revolution, providing the raw materials for such visionaries as Sir Richard Arkwright, Matthew Boulton, James Watt, William Murdoch and Josiah Wedgwood.

The area has produced a wide range of interesting mineral specimens. Examples of these are to be found in local and regional museum collections, and especially at the Natural History Museum in London. However, such was the importance of Britain in the development of mineralogy as a science that specimens from the English Midlands are to be seen in collections all over the world. Minerals such as phosgenite, matlockite and mottramite are recognised as having been first described from the English Midlands. The hard rock quarrying industry of Leicestershire means that fresh exposures are constantly being created, and new mineralogical discoveries continue to be made today.

This talk will provide an overview of the fascinating stories associated with the mines, quarries and minerals, illustrated by images taken especially for a recently published book Minerals of the English Midlands.

**October 31<sup>st</sup> 2018:** Volcanism in Antarctica, reconstructing past environments and the survival of Life

John Smellie, School of Geography, Geology and the Environment,  
University of Leicester, LE1 7RH, UK

Antarctica is one of the world's largest volcanic provinces, with the most recent widespread phase of volcanism stretching back continuously to 30 million years ago, coincident with the dawn of the Antarctic Ice Sheet. Many of the volcanoes preserve surprisingly fine details of their eruptive (environmental) setting, an ability that is particularly characteristic of glaciovolcanoes (i.e. volcanoes that erupt in association with ice). Several critical parameters of past ice masses can routinely be deduced from studying glaciovolcanic outcrops and, just as important, many of those parameters are deduced quantitatively, something no other methodology can achieve. Glaciovolcanic studies are thus the most powerful & holistic method for studying past ice masses currently available. Recent studies have also demonstrated unexpected new evidence for non-glacial conditions. Although volcanic studies can be used to resolve important environmental problems, such studies are still very uncommon. However, they have been widely applied in Antarctica. This talk will briefly introduce Antarctica's volcanoes before presenting the results of selected volcanic studies in order to demonstrate the power of such investigations for understanding Antarctica's past environments and how Antarctica's ice sheet

might impact on our future in a warming world. Finally, it will be shown why it now seems that Antarctica's volcanoes may also be the missing link that enabled Life to persist through multiple glacial cycles.

### **November 14<sup>th</sup> 2018**

Karst processes on the edge of the Derbyshire carbonate platform – a tribute to Trevor Ford.

Dr Vanessa Banks, British Geological Survey.

Mineralisation of the southern edge of the carbonate platform, Derbyshire has given rise to a number of interesting geological features that provide an opportunity for geological process understanding and a challenge to engineering. Recent excavations have provided an opportunity to build on the legacy of research undertaken by Trevor Ford and others. The presentation will describe the geological context, the range of sediments and the problems that they present to engineering.

## **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. Refreshments served from 7.00pm.  
Details: Chairman Mark Evans, mark.evans@leicester.gov.uk, 0116 454 0231

### **2018**

#### **Wednesday November 28<sup>th</sup>**

Dr Rowan DeJardin (University of Nottingham). **Reconstructing Holocene oceanography around the sub-Antarctic island of South Georgia.**

#### **Wednesday December 12<sup>th</sup>**

Christmas Meeting, venue *University of Leicester*

### **2019**

**Monday January 7<sup>th</sup>** Parent Body Lecture, New Walk Museum, Leicester  
Dr Phil Wilby (British Geological Survey). **The Ediacara biota and its role in the evolution of the modern world: an update of recent major advances.**

#### **Wednesday January 16<sup>th</sup>**

Dr Andrew Miles (University of Leicester). **The Shap granite: A Lake District conundrum.**

#### **Wednesday January 30<sup>th</sup>**

Dr Catherine Russell (University of Leicester). **Rivers in the rock record: from Utah to Wales.**

#### **Wednesday February 13<sup>th</sup>**

Members' Evening, venue TBC.

#### **Wednesday February 27<sup>th</sup>**

Jordan Bestwick (University of Leicester). **Reconstructing diets of pterosaurs and**

**other extinct animals – problems and solutions using dental microwear textural analysis.**

**Saturday March 9<sup>th</sup>**

Annual Saturday Seminar, University of Leicester.

**[Working title: Geology Under the Sea]**

**Wednesday March 13<sup>th</sup>**

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

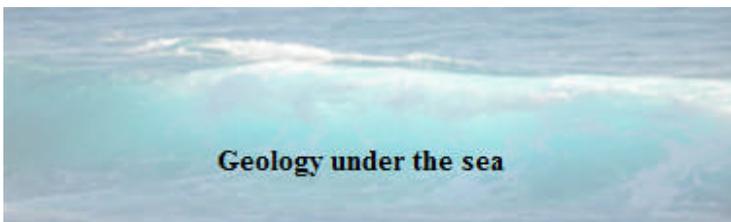
**Wednesday March 27<sup>th</sup>**

Annual General Meeting and Chairman's Address by Dr Mark Evans (New Walk Museum, Leicester). **The Mesozoic Marine Reptile Renaissance: Part 3.**

**Thalattosuchians, the Mesozoic marine 'crocodiles'.**

**SECTION C COMMITTEE 2018-19**

<b>Chairman</b>	<b>Mark Evans</b>
<b>Vice-Chairman</b>	<b>Roger Latham</b>
<b>Secretary and Membership Secretary</b>	<b>Fiona Barnaby</b>
<b>Lecture Programme Secretary</b>	<b>Tom Harvey</b>
<b>Field Programme Secretary</b>	<b>Robert Tripp</b>
<b>Publicity Officer</b>	<b>Albert Benghiat</b>
<b>Webmaster</b>	<b>Robert Tripp</b>
<b>Charnia Editor</b>	<b>Brian Waters</b>
<b>Members</b>	<b>Dennis Gamble</b>
	<b>Roger mason</b>



Leicester Literary & Philosophical Society

**Geology Section Annual Seminar 2019**

**9<sup>th</sup> March 2019 at Leicester University**



The programme will include:

- **History of deep sea exploration**
- **What we can learn about the history of the earth from microfossils and sediments**
- **Studying geological events under the sea**
- **The practical and economic uses of the information gained**



More to follow at [www.charnia.org](http://www.charnia.org)