CHARNIA

NEWSLETTER

of the

Geology Section

of the

Leicester Literary & Philosophical Society

www.charnia.org

MAY 2016

STONES IN A ROW

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VISIT TO OXFORD UNIVERSITY MUSEUM

Rob Tripp

The first field trip by the Section this year was to the Oxford University Museum of Natural History, on Saturday 9th April.

We were welcomed outside at 10.00 by Dr Monica Price, Collections Manager (Mineralogy and Petrology) at the Museum, who, during the previous Winter Programme, had given the Section a well-received talk about the Corsi Collection, which is housed in the Museum. Inside the Museum we were introduced to Dr Hilary Ketchum the Collections Manager, Vertebrate Palaeontology.

After a photo-call in the main hall, we went behind the scenes with Hilary – into those areas from where, in the event of Fire, the emergency services are requested to evacuate the priceless collections. The amazing juxtapositioning of artefacts and their pictorial representation in the old catalogues was shown to us; as was what is now known to be the first collected dinosaur tooth, but not recognised as such then, from the end of the 1600s ... a collection over four hundred years old!

After an hour with Hilary, we moved to the Mineralogy department, where Monica demonstrated the Corsi Collection of Decorative Stones (see web address below) - mostly marbles and igneous rocks that have been used since Roman times. We also viewed the excellent mineral samples from the store, and Derbyshire galenas (which Ron hopes to provenance) and the meteorites in the collection.

In modern parlance, it was awesome! We were impressed by the collections. We thank Monica and Hilary for taking time to lay out the illustrative samples that we viewed, and for their knowledge that they imparted.

We are pleased to have been invited to return at a later date.

www.oum.ox.ac.uk/corsi/stones

COVER PICTURE:

The Roman Gartree Road, Stonton Wyville, looking southeast, with one group of 'large mystery boulders' in the dip and another out of sight at the top of the hill. See p. 10 for Roy Clements' reality check turning out to be more interesting than any myth or legend

THE EDITOR WRITES ...

With the field outings programme in full swing, here is the early summer edition of Charnia. I hope you enjoy the mix of news and articles - my thanks to the authors for their welcome contributions.

Let us know if there's anything you would like us to do differently.

The successful, well-attended and interesting 2015-16 programme of talks ended with the AGM. Last year's committee were disappointed that none of you members felt able to step forward to help run your Section C. The outcome, as you will see on the back page, is that officers who should have stepped down have either doubled up jobs or been persuaded to continue 'for just one more year'. Membership is thriving, the talks and trips are excellent and well-attended, and the finances are in good shape, but the Section won't run itself, I'm afraid. PLEASE bear this in mind next March, when the AGM comes round again ... without your help we could have a bit of an (unnecessary) crisis.

I promise: being on the committee isn't onerous, in fact it's fun; but the same old faces can't keep on doing it for ever. Contact me or one of the Acting Chairs for informal information if you're interested and could be persuaded.

Bearing in mind the time of year, I end inappropriately on a Christmassy note, with a pictorial reminder of the Christmas 2015 meeting at New Walk Museum. Have a great summer!

John Martin, *Charnia* editor johnmartin424@aol.com 07920 480098

Abstracts of the February and March talks

Models of morphological evolution during vertebrate terrestrialisation

Dr Marcello Ruta, School of Life Sciences, University of Lincoln

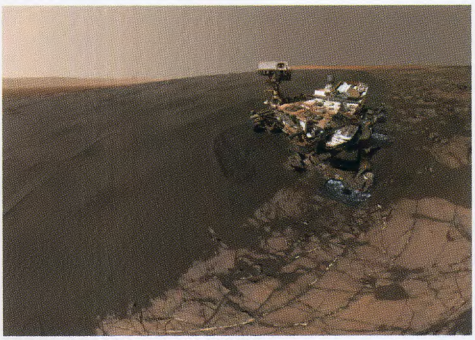
Wednesday February 24th

This talk summarized current research developments in the field of early limbed vertebrate evolution. The last three decades have witnessed an astounding proliferation of early tetrapod studies, spurred by novel fossil finds, reinterpretation of existing data, and the widespread use of comparative methods in macroevolutionary analysis. The first part of the talk reviewed existing debates, particularly conflict in early tetrapod phylogenies and possible solutions. The second part focussed on models of skeletal changes in the appendicular skeleton across the fish-tetrapod transition. The final part looked in detail at the evolution of the humerus, as this bone underwent some of the most profound re-patterning of any skeletal element. The final part of the talk also illustrated the potential of comparative methods in the study of evolutionary patterns and processes, particularly analyses of evolutionary rates, models of diversification, and morphological disparity.

Exploring Mars

Prof John Bridges, Department of Physics and Astronomy, University of Leicester

Wednesday March 9th



Curiosity self-portrait: NASA

The Curiosity Rover has revealed an ancient lake on Mars and changed our view of how that planet may have been habitable 4 billion years ago. Our view of Mars as having a purely basaltic igneous crust has also changed as we find evidence for more silica-rich igneous rocks. We are following up our discoveries on MSL (Mars Science Laboratory) by planning a European Rover – ExoMars. The University of Leicester is heavily involved in this Mars exploration.

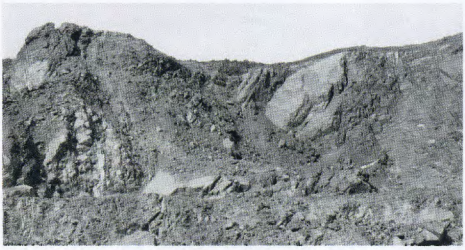
More ideas on the fauna of Old Cliffe Hill Quarry, Markfield

Helen Boynton

This is a follow-up to the article in the January 2016 issue of *Charnia*.

As it is now very difficult to gain access to the fossiliferous beds at Old Cliffe Hill Quarry owing to the move of the rock crusher, I am giving a pictorial summary of the fossils known to me that have been found at the site over the years. The list includes records of fossils, moulds/casts and photographs. The quarry opened for the extraction of diorite and 'slate' (Bradgate Formation) in 1870.

Panorama of the quarry in 2009. Photo by Pauline and Steve Crutchley



North face of the quarry, probably in the 1980s

In 1960 Bob King went there searching for minerals, but he also found several large ovoid discs. He returned with Trevor Ford in the 1980s and collected five discs, which are now in the Department of Geology collection at Leicester University. King and Ford named the discs *Cyclomedusa sp.*

Cyclomedusa sp. King & Ford, 1980s
Leicester University photograph

In the meantime, Andy Mathieson and Mike Jones from Leicester Museum had been investigating at the quarry in 1972, bringing back five specimens for the museum's collection. One of these (next page) had a rope-like outer ring and a very thick 'stem', but no frond.

One of the specimens collected by Mathieson and Jones in 1972, with its thick outer ring and apparent boss and stem

The huge block found in the 1980s, before it was broken to produce the holotype of *Cyclomedusa cliffi*

In the late 1980s members of my Adult Education class – one was Margaret East, a long-standing Section member who sadly died last year – went with me on a hot Sunday afternoon; we found a huge fallen block, which the quarry people broke up for us, enabling us to collect three of the five specimens identified on the main bedding surface.

Margaret East's *Cyclomedusa*

The holotype of *Cyclomedusa cliffi* Leicester Museum collection

One went into Margaret's collection, part of the second went to the BGS collection, and the third became the holotype of *Cyclomedusa cliffi* and is now in Leicester Museum's collection. Shortly afterwards the quarry closed, not re-opening until 2009 when BGS made an official visit to take moulds from four more discs (more on this next time).

A new quarry manager was appointed in 2012, and Aron Bowers, Denis McVey and Alan Cook were given permission to study the Bradgate Formation *in situ*. They found several more discs, and an apparently new type of trace fossil for the Charnian: an extensive branching network, which Aron described and named as "*Plumatosus boyntoni*". Unfortunately his paper has not been submitted, as yet, while for various reasons the group has ceased work, at least for the time being.

Aron Bowers' 2012 "*Plumatosus boyntoni*" - possibly the same structure or organism as noticed by Ben Bland in the 1980s

It turns out that Ben Bland (pers, com.) had seen a similar structure at Old Cliffe Hill in the 1980s, describing it as 'like sisal matting'.

The large discs (holdfasts?) from the 2012 project have variable morphologies, perhaps the result of depositional, taphonomic and metamorphic effects – the bedding planes have ripple marks, indicating shallow water and a current, while the Bradgate Formation has been contact-metamorphosed by the adjacent diorite intrusion and distorted by later tectonics. As in 1972 no fronds were found, but if the large discs were holdfasts, the associated fronds, whether single or branching, would probably have been large in proportion.

Alan Cook and Mark Williams (Leicester University), as members of the Charnia Research Group (CRG), scanned one of the structures (they called them 'vesicles') that the three collectors had found in 2012. It consisted of 15 miniature rings, each with a central dot; were these juvenile discs? Alan has since left CRG due, sadly, to ill-health, so that work is on hold.

Will this be the end of collecting at Old Cliffe Hill? The crusher is now positioned in front of the fossiliferous section of quarry face, so it is possible that many of any remaining fossils have already gone into roadstone. We will see: luck may be on our side. If any readers have bedding plane specimens, or photos, from Old Cliffe Hill they could be important. Please tell me about them.

Helen Boynton (7 The Fairway, Oadby; 0116 270 6806; or contact the Editor by email)

Acknowledgements: Thanks to Frank Ince for information on the crusher, to Midland Quarry Products (Manager Paul Campion) for permitting access when possible, and to others for discussion and photographs as credited.

Loess research at Leicester University

Ian Smalley, Geography Department, Leicester University

The Centre for Loess Research & Documentation has been operating in the Geography Department for thirty years so it's probably time for a brief look at what has been achieved. The Centre came into being in the mid-1980s as a result of a large EU grant awarded to Prof. Ed Derbyshire to investigate slope stability problems in Lanzhou, in China. Everybody knows three things about loess: it's yellow, it's wind deposited, and it's in China. In fact some of the thickest deposits are indeed near Lanzhou; over 300m thick. Loess became big news in Quaternary Geology in the latter years of the 20th century because it contained an accurate and accessible record of climatic variations for the last two million years - but our main interests were geotechnical. There were severe slope stability problems in the vicinity of Lanzhou.

We suffered a set-back immediately. We were relying on the Engineering Department for the various critical soil mechanics tests which underpinned the project when, out of the blue, the civil engineering degree was abandoned and all the labs were closed. In some ways it was a lucky chance because we were forced to make links with the Civil Engineering Department at Loughborough University and carry out the tests there. Loughborough was pleased to see us, we brought money and the prospect of publications. In fact, the work done and the papers published led directly to Chris Rogers and Ian Jefferson getting their chairs at Birmingham. The Loughborough cooperation was very successful and led to the development of several new ways of modelling loess collapse and, unexpectedly, some useful studies of loess in Libya. Cooperation became the order of the day and we spread in the UK to Nottingham Trent University (NTU) and the Geological Survey at Keyworth, and in Europe to Novi Sad University in Serbia and Wroclaw University in Poland.

At NTU we participated in a British Council project in Uzbekistan, and from Tashkent University generated some useful papers on the Central Asian loess; but the great overseas cooperation was the Danubian Project. The loess in the Danube Basin was, and remains, a major concern for the Centre. As Eastern Europe changed politically, more loess deposits became accessible, in particular the best and most spectacular deposits in Vojvodina, in northern Serbia, which are nicely reachable from Novi Sad.

We had an interesting project from NATO, to consider the possibility of burying nuclear waste in the thick loess deposits at Kozloduy in Bulgaria. The Kozloduy nuclear power station sits on a high loess bluff overlooking the Danube, and it obviously makes sense to bury the waste in situ, to avoid any hazardous transportation. We designed a simple repository, between two convenient palaeosols, and now, after many financial delays it is being built. If more money can be raised, another nuclear station will be built on an island in the Danube. There were rumours that the site was situated on a fault, but examination of the loess showed that there had been no fault

activity since its deposition in the Quaternary.

During field work in Ukraine, an interesting minor project was generated. We have been examining the relationships between cliff-nesting nesting bird species and loess. The most interesting species is the bee-eater, and we have studied behaviours in Europe, Africa, India and Australia. The Australian results are perhaps the most interesting because loess distribution in Australia is not well demarcated; the distribution of the birds' nesting activity, however, proves to give a good indication of the variation in ground properties and type - it more or less maps the distributrion of loess.

If loess interests you, have a look at the 'Loess Ground' blog or visit the Loess Letter website, maintained by Michigan State University, at:

www.loessletter.msu.edu

Australian rainbow bee-eater
Merops ornatus
JJ Harrison - Wikipedia

SUMMER 2016 FIELD EXCURSION PROGRAMME

4th June	Blockley Quarry, Gloucestershire	Dr Mike Howe
3rd July (tbc)	Bradgate Park archaeology & geology	Dr D Miles-Williams
8th-10th July	Weekend excursion, Lake District	Dr Simon Drake
6th Aug (tbc)	Creeton Quarry, Lincolnshire	Steve Johnson
3rd Sept	Great Tew Quarry, Oxfordshire	Paul Keyte

For details and to register please contact Rob Tripp rob.n@newford.u-net.com

Dark Matter and the Dinosaurs

Tim Johnson

For much of my life I wondered if the possible origins of Stonehenge outnumbered the different possible causes of the extinction of dinosaurs. Or was it vice versa? But now a new book has shed some light on one of them. Perhaps.

Lisa Randal, a senior theoretical physicist at Harvard, has come up with an intriguing possibility.

But first a brief diversion. One my heroes is Vera Rubin, who discovered what has become known as dark matter back in the 1980s. She was the daughter of east European immigrants to the USA, and as a girl became obsessed with astronomy. But after graduation in science she was refused a place to research astronomy because she is female. One university, seeing that her CV mentioned an interest in painting, suggested she built up a career in sketching celestial objects! But she persevered, and eventually was able to start work studying the Andromeda galaxy. Galaxies were the hot topic of the time, so she decided to look at the outer regions of her galaxy, and quickly noticed that the stars there seemed to be attracted by something invisible. Her paper on this was ignored for a decade or more, but now she is fully acknowledged. The current consensus view is that the universe's mass/energy is about 95% invisible ('dark matter' and 'dark energy'), and only 5% is the stuff astronomers have been studying for centuries.

Randal's theory, at present little more than 'thought experiment' is that the 'dark matter' in and around our own galaxy consists in part of a thin but dense disk, slicing through the plane of the galaxy. The earth's motion consists of circling through the spiral arms of the Milky Way (one revolution in 250 million years) and also of bobbing up and down through the galactic plane (passing through the plane roughly every 33 million years. This means that the gravitational influence on our solar system of the dark energy disc is at a maximum then. It is therefore possible that the outer regions of the solar system (consisting of a huge number of rocky and icy bodies in the Oort Cloud and Kuiper Belt, some of them quite large) could be flung out of their stable orbits. Then some might get into the inner solar system as comets.

A British team of London University academics is just starting a study of the Chicxulub Crater in Mexico, the likeliest site of the impact that probably saw off the dinosaurs. Randal has been trying to date other large impacts. The work is difficult because, on land, erosion removes evidence pretty quickly and, since almost three quarters of the planet is water, most impacts are unknown. But she has found tentative evidence of a 33 million year cycle, which, if correct, means we are in the frame for disaster about now. But of course "about now" in

geological terms means a time interval of at least tens of thousands of years.

Randall's book* is very clear, with an admirable grasp of topics outside particle physics, and includes (p273) a snap of her in a walk-in part in the popular US TV show 'The Big Bang Theory'.

Dinosaurs would have appreciated that.

*Lisa Randall, 2015. **Dark Matter and the Dinosaurs**. The Bodley Head, London

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With Geology in Mind – out and about in Leicestershire and Rutland – 2.

Stones in a Row in Stonton Wyville – the Romans didn't come by

Roy Clements

This jaunt involved a number of comings and goings, and a number of people, and in the end reached a rather lame non-conclusion, but getting to this result was good fun and quite enlightening.

The boulders of Group 1, lateral view

It started with an e-mail picture out of the blue: "Are ... you familiar with these aligned rocks near Glooston? Further east there are 7 aligned in the same

direction - pointing to sunrise at the winter solstice." The accompanying photographs showed a roughly linear group of three stones (boulders). The two groups of boulders are clearly visible on the Google Earth image of the area, and lie along the course of the old roman Gartree Road, which crosses the northern margin of a field of pasture which shows beautiful ridge-and-furrow markings of medieval strip farming. A place to visit!

Group 1, end view showing the "error bars" – the practical problems of measuring a precise orientation

So, on the spur of the moment, my wife and I visited the 'Glooston' site (actually in Stonton Wyville) last May, by way of the gated field road that runs north out of Stonton Wyville, and which heads directly to the first of the groups of 'stones' (arbitrarily named Group 1 - the three-boulder group). Group 2 (the seven-boulder group) could be seen in the distance by the gate leading to Glooston. Both groups are immediately to the south of the line of the Gartree Road with National Grid references of SP7350 9617, and SP7370 9605 respectively.

Group 1 is a six-metre string of boulders and has a roughly NE/SW orientation; from the Google Earth image this is c.068°E of N (unspecified) +/-20°. In contrast, Group 2 is about eighteen metres long, and has a roughly NW/SE orientation: from the Google Earth image this is c.131°E of N, +/-4°. Actually,

The boulders of Group 2, lateral panorama

Group 2, showing the curvature of the row

from Google Earth (and this was confirmed on the ground), the string of Group 2 is slightly arcuate, with an overall bearing varying from c.132°E of N for the

main (more easterly part) of the string, and c.125°E of N for the more westerly part of the string. The arrangement of the boulders was clearly the work of man, but there obviously is a problem in saying they were there "pointing" at anything (topographical or astronomical). Clearly we were dealing with 'stone rows' as opposed to 'stone alignments'.

The boulders of both groups are all more-or-less of the same material, for which, at the time of our visit(s) not enough detail could be seen to make a proper identification. The rock is massive, probably medium to coarse sand-grain-size, with many quartz and quartzo-feldspathic veins, and signs of diastrophic structures (tension gashes; fractures; slickensides). The colour is a greenish (chloritic) grey (suggesting low-grade, greenschist facies metamorphism), with a 'secondary' brownish purple 'weathering'. (Some red/brown surface staining seemed to indicate Triassic weathering.) In all, I thought Charnwood to be a good possible source for the material. The boulders all have a combination of smoothed/sub-rounded surfaces, and later, more 'freshly' fractured surfaces. (The more northerly of the Group1 boulders has a 'recent' fracture parallel to its base.) I looked hard, but could find no convincing evidence of glacial striation on the 'smooth' surfaces, but on this early visit, I still hung on to the idea that ultimately the boulders might be glacial erratics. We needed better identification of the rock-type and of its 'home' source to help check on this. [We noted that Poole et al (1968) in the BGS Harborough Sheet Memoir make a point about the relative abundance of Charnian-derived erratics in the area. However, the British Association for the Advancement of Science Erratics Committee Reports (late nineteenth century) that I have seen (1874, 1878, 1881) make no mention of these two localities.]

Group 2, showing the unusable field gate

Further visits followed, and it became clear that we were dealing with something much younger, at least in terms of the placing of the boulders. Firstly, it became clear that the two groups of boulders seemed to be associated with features of the road system (Group 1 with the road junction; Group 2 with the gated exit of the Roman road towards Glooston). Secondly, it was noted that Group 2 boulders rendered an old field gate unusable as far as farm vehicles were concerned! Shortly

thereafter, contact was made with the former tenant farmer of the land who, while not directly involved, said that the boulders were put there by 'the Council' to deter off-road vehicles, and came on 'big lorries'. He didn't know the source [of the stone] but agreed that Charnwood was likely. The arrangement of the boulders was decided by the Council workmen. They also made the ridge and ditch that we had noted alongside the Gartree Road. From this account, it is not clear whether the Council involved was Leicestershire County, or Harborough District. Having been in contact with people within the County Council, this remains unresolved, but I have been supplied with two aerial photographs of the site: one, apparently dating from 2006, shows the two groups of boulders and the ridge and ditch along the Gartree Road; the other, apparently dating from 2000, shows none of these features! So there we have it, except my informants could find no records as to the source of the rocks.

Rock types compared. Hand specimen of the middle boulder of Group 1 (top left); Same specimen immersed in water, to show texture - note quartz vein, crude foliation/cleavage, and a large clast(?) with a texture different to that of the matrix (lower left); Breccia, tuffaceous; with clasts of bedded rock. Blackbrook Group, Charnian Supergroup. Morley Hill Quarry, near Shepshed. University of Leicester, Department of Geology specimen LEIUG 14794 (top right); LEIUG 14794, immersed in water to show texture (lower right)

However, last September, I received some small hand specimens that had recently been collected. One of them is illustrated here (previous page). The rock is clearly a coarse sandstone-grade volcaniclastic, and has a lot of feldspar (both clean plagioclase, and some provisionally being called orthoclase), there is also free quartz within the fabric of the rock (over and above that in the numerous veins), some biotite, etc. The rock has a distinctive mottled appearance (mauve-pink spots (feldspar) in a greenish grey (chloritic) matrix), and it has a rather more foliated structure than might be expected from the appearance of the boulders – a crude, rather irregular cleavage. The image of the water-immersed specimen apparently shows large, matrix-supported clasts. I was able to compare these specimens with those housed in the local geology collection at Leicester University. One specimen, LEIUG 14794, from Morley Hill Quarry in northern Charnwood, provided the best match.

So, some lumps of coarse Precambrian volcaniclastic rock. Not there to be seen by the Romans, nor by our medieval forebears, and certainly not by star-gazing ancient Britons, but a modern means of controlling a modern phenomenon – off-roaders.

We did however, have a memorable lunch at "The Crown" in Tur Langton.

There are still off-roaders – but they use the road!

Thanks to: Richard Jameson, Aftab Khan, John Hudson, John Martin, Helen Boynton, Graham Walley, Helen Wells and Mr. M. Berry. Leicester, Department of Geology specimen LEIUG 14794.

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