CHARNIA



Hock Cliff on the Severn, to be visited on the weekend excursion

The newsletter of the Geology Section (C) of the Leicester Literary & Philosophical Society

www.charnia.org.uk

May 2008



Charnwood Lodge views 1



Editorial

With the golden glow of the success of the most recent Saturday Seminar just receding over the horizon, some of us (at least) are starting to think about what to do for next year. For once, the choice of theme might not be too difficult to identify, seeing as in 2009 it will be 200 years since the birth of Darwin. 'Something with a Darwin theme' has already been floated in committee, but the details remain to be decided. Personally, I like the idea of a historical seminar, focussing not only on Darwin, but also including talks on other pioneer geologists from our science's early years. Putting aside the obvious corollary that we would have to find someone who can speak on any particular figure, the question remains as to who might be included, as there are a number of important geologists who have claims to be featured. And that in turn leads to thoughts of one's own favourites, and who we personally would like to see on the programme. Before giving my own personal choices, perhaps it might be helpful to look at some of the candidates.



Three of Geology's early pioneers: Murchison, Mantell and Lapworth

Very much a front runner would be William Smith (1769–1839), the father of English geology and pioneer of stratigraphic cartography, whose marvellous maps elucidated the stratigraphy of England for the first time. And what better qualification for inclusion on the programme than identifying, delimiting and naming a geological period (or two)? Under that heading we would have to include Roderick Murchison (1792–1871), Adam Sedgwick (1785–1873) and Charles Lapworth (1842-1920). And Charles Lyell (1797–1875), in the course of his studies of the Tertiary, erected the Eocene, Miocene and Pliocene. Lyell was also instrumental in robustly promoting the theory of uniformitarianism, and assuring its eventual acceptance. In considering the early literature of geology, Lyell's three masterworks (*Principles of Geology, Elements of Geology and Geological Evidences of the Antiquity of Man*) stand without compare. Everyone loves a bit of controversy, and we had some classic clashes in the 19th century as the fundamentals of geology were first debated, so over in the red corner might be Richard Owen (1804–1892), while in the blue one his opponents Darwin, Gideon Mantell (1790–1852) and Thomas Huxley (1825–1895) would have to wait their turn to take him on. And while no-one would claim that Mary Anning (1799–1847) was in any way an academic, her immense contribution to the advance of vertebrate palaeontology cannot be disputed, and would well qualify her for inclusion on our hypothetical programme.



Three leading geologists of a later generation: Marr, Holmes and Gould

We shouldn't ignore pioneers from other countries either. Of these surely Georges Cuvier (1769–1832), Louis Agassiz (1807–1873), Edward Drinker Cope (1840–1897) and Othniel Charles Marsh (1831–1899) have claims to be included? And we cannot overlook the claims of other British pioneers such as Buckland (1784-1856), De La Beche (1797-1855) and Conybeare (1787–1857). Of course, not all geological breakthroughs occurred in the early years of the science, and later workers also made fundamental discoveries. The theory of plate tectonics was undreamed of before Alfred Wegener (1880–1930) published his inspirational studies in the early years of the 20th century. Subsequently, Arthur Holmes (1890–1965) developed and advanced this revolutionary idea, as well as furthering the cause of geochronology using radiometric methods, and he also published possibly the most popular handbook to geology of all time, *Principles of Physical Geology*. There were many fierce arguments in the early years of geology,

but that aspect by no means diminished as time went by and in our own day two leading geologists with opposing views, Stephen Jay Gould and Simon Conway Morris, have enlivened the evolutionary debate that first began when Darwin and Alfred Russel Wallace (1823–1913) first brought out their theories and ran headlong into furious opposition.

So to my own 'top six', and one reserve (Darwin being already included). I make no excuse for this biased choice, based as it is on my own geological predelictions. In no particular order – Charles Lyell, Gideon Mantell, J. E. Marr, Linsdall Richardson, Louis Agassiz, James Hutton and Arthur Holmes.

Always happy to pass on a recommendation for a good book, Bruce Harris tells me that *Unearthing the Dragons* by Mark Norrell is a worthwhile read and ties in nicely with our 'Dynamic Dinosaurs' Saturday Seminar. It can be obtained online for around £9. Of course, we have a distinguished local author amongst our ranks in Helen Boynton and I can recommend Helen's latest book on the memorial masonry in Welford Road cemetery, entitled *Geology of Gravestones in Welford Road Cemetery*, available at £7.50 from local outlets and direct from the author.

Finally, I have a correction to make. In my keen, but uninformed, enthusiasm for the hominid theme in my last editorial I indicated that 750,000 to 1,000,000 years ago it might have been *Homo sapiens* or *Homo neanderthalensis* that first colonised our island. Quite properly, I was informed that true *H. neanderthalensis* did not appear until around 150,000 years ago, and therefore the species couldn't have been here several hundreds of thousands of years earlier!

Andrew Swift

Summer Programme 2008

For more details, please contact the Field Secretary, Helen Jones, 0116 239 2872, helenjonesx@hotmail.com

Saturday May 17th

Chatsworth House and Mineral Collection. Leader: Mick Cooper, Nottingham Museums.

Friday June 20th to Sunday 22nd

Weekend field excursion to the Cotswolds. Based in Winchcombe. Leader: Andrew Swift, Digitimage, Leicester.

Sunday July 13th

Castleton, Speedwell, Cavedale and Dirtlow Rake. Leader: Gerry Slavin

Saturday August 9th Blockley Quarry, Gloucestershire. Leader: Dr Mike Howe, BGS.

Saturday September 6th Ketton Quarry, Rutland. Leader: Professor John Hudson. Joint meeting with the Warwickshire Geological Conservation Group.

Saturday October 11th Lapworth Museum, University of Birmingham. Leaders: Professor Paul Smith and Mr Jon Clatworthy, University of Birmingham

Winter Programme, 2008-2009

All talks 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 Dr. Joanne E. Norris or Editor Andrew Swift, 0116 2833127, i.e.norris@ntlworld.com

2008

Wednesday October 8th Dr Stewart Fishwick (Dept. of Geology, University of Leicester): Theme: Geophysics and diamond mining?

Wednesday October 22nd Dr Michael Howe (British Geological Survey, Keyworth): Preserving our geological heritage: the curation of fossil and mineral collections.

Wednesday November 5th

Geologists' Association 150th Anniversary sponsored lecture. Professor Jim Rose (Department of Geography, Royal Holloway, University of London): **The landscape, environment and climate of the earliest humans in northern Europe**

Wednesday November 19th

Dr Cheryl Jones (Department of Applied Sciences, Geography & Archaeology, University of Worcester): The Abberley and Malvern Hills European Geopark. Promoting earth heritage, culture and sustainable regional economic development Wednesday December 3rd Dr Giles Miller (Natural History Museum, London): The use of Synchrotron radiation to examine micropalaeontological specimens

Wednesday December 17th Christmas Meeting, New Walk Museum, Leicester

2009

Wednesday January 14th Dr Chris Duffin (Streatham and Clapham High School, London): Louis Agassiz (1807-1873), fossil fish and the Ice Age

Monday January 26th

Parent Body Lecture, **New Walk Museum, Leicester. Dr Phillip Manning** (School of Earth, Atmospheric & Environmental Sciences & The Manchester Museum, University of Manchester): **Grave secrets of dinosaurs**

Wednesday January 28th

Professor Stephen Hesselbo (Department of Earth Sciences, University of Oxford) Theme: **Triassic-Jurassic boundary?**

Wednesday February 11th Members Evening, New Walk Museum, Leicester.

Wednesday February 25th TBA

Wednesday March 11th TBA

Saturday March 14th Annual Saturday Seminar, University of Leicester, 9.30 am – 5.00 pm Theme: Darwin and the early giants of geology?

Wednesday March 25th

Annual General Meeting, and Chairman's Address Dr Joanne Norris (Halcrow Group Ltd., Peterborough). **Rocky tales of a** geotechnical engineer.

Saturday Seminar 2008

Reflecting the all-pervasive popularity of everything dinosaurian, this year's annual Geology Section Saturday Seminar on March 15th explored the world of "Dynamic dinosaurs: cutting edge approaches to ecology and behaviour".

The event was tied in with National Science and Engineering week, and as usual attracted a large public and academic audience, including a large representation of Geology Section members. Persuasive lobbying by the organisers resulted in a list of front-line speakers, a line-up which again reflected the ability of the Geology Section to identify the cutting edge of our science and attract the big-hitting personnel to put the message across.



Seminar speakers: Laura Porro, Paul Upchurch, Dave Unwin, Angela Milner, John Hutchinson, Vince Williams, Phil Manning and Bill Sellers

After a welcome from Section C Chairman Joanne Norris, the first morning session focused on living dinosaurs. Kicking off for the home team, **David Unwin** (Dept of Museum Studies, Leicester University) examined the evolution of that remarkable dinosaur innovation, the feather. He showed that although we have a useful developmental framework for feather origin – a simple linear progression of increasing structural complexity, derived from studies of extant birds – only the fossil record can reveal the distribution of these various morphological stages within dinosaurs. It should probably come as no surprise that the record suggests a far more complex picture, with multiple losses and gains of different morphologies in different groups of dinosaurs. Despite all the recent discoveries of feathered dinosaurs, there clearly remain substantial gaps in our knowledge of feather evolution.

We do know that *Archaeopteryx* sported feathers that were almost indistinguishable from those of modern birds, but did it possess the neural equipment necessary for flight? Thanks to the close fit of the archosaur brain into the archosaur skull, **Angela Milner** (Natural History Museum, London) was able to use CT scans of braincases to generate virtual endocasts. These reveal that *Archaeopteryx*'s gross brain organisation was more avian than crocodilian, indicating that much of the distinctive physical structure of the bird brain originated early in the evolution of the group. Unfortunately, three-dimensionally preserved braincases are a rarity in bird fossils, but results from similar analyses of early seabirds suggests that tracking neural evolution in birds is possible using this technique.



Microraptor, from the Early Cretaceous of China. (from Unwin talk)

Attention turned next to dinosaur feeding. Laura Porro (Dept of Earth Sciences, Cambridge University) presented her research into the unusual jaw mechanics of the early ornithischian *Heterodontosaurus*, focused around the now seemingly ubiquitous Finite Element Analysis, an engineering technique which models stress and strain in 3D structures during function. Vince Williams (Dept of Geology, Leicester University) then talked about his work, demonstrating the power of tooth microwear analysis – quantifying damage patterns on teeth generated during function – to test and constrain hypotheses of jaw kinematics in hadrosaurs. Both talks highlighted the uniqueness of dinosaurs: in the absence of good extant feeding analogues,

novel methods of obtaining information from the fossils themselves seem to represent the best chance of understanding dinosaur feeding.

After indulging in some jaw kinematics of our own over lunch, we took an afternoon walk with dinosaurs, as **Phil Manning** (University of Manchester) illustrated the plethora of high technology he and co-workers were utilising to elucidate function in the important but often overlooked elastic components of dinosaur locomotary systems; an endeavour that may be aided considerably by the discovery of an exceptionally preserved hadrosaur mummy, complete with skin microstructure, organic residues and an unfortunate crocodile (they can't fit through the mouth of a carcass, so apparently crocodiles favour the easier orifice towards the rear; in this case it seems there still wasn't enough space. What a way to go.).



A virtual 'race' to establish relative speeds (from Sellers talk)

Then for something completely different: **Paul Upchurch** (University College, London) gave us an introduction to dinosaur biogeography. Detailed quantitative analysis of the similarities and differences in vicariance patterns for various dinosaur groups can indicate whether the distributions were driven by intrinsic ecological factors or were the result of geographic contingency. Interestingly, the results suggest that dinosaurs originated on the continent perhaps least historically associated with the group: South America.

Returning to dinosaur locomotion, **Bill Sellers** (University of Manchester) again raised the difficulty of finding dinosaur analogues in the modern world:

specifically, no living organism moves like a bipedal dinosaur. Using evolutionary robotics, he is trying to teach computer models of dinosaurs to walk, by searching through the astronomical numbers of potential muscle movements to find functionally optimal gaits. Certainly the twitching and stumbling models produced to date bear little resemblance to the slick Hollywood imagery to which we are accustomed, but the models are in their infancy. And unlike the primarily artistic visions of film makers, this approach has potential to generate reconstructions both visually appealing *and* biomechanically viable.

Finishing the presentations on a somewhat philosophical note, **John Hutchinson** (Royal Veterinary College, London) encouraged us to consider what is wrong with models of dinosaur biomechanics, rather than what is right; in particular, to acknowledge the errors and ambiguities inherent in the assumptions on which they are based. Since these uncertainties will always be present, no matter how advanced the models, the way they are presented is a key consideration for the communication of science to the media and public.



The reception, a chance to chat to the speakers in relaxed surroundings

There followed an open floor discussion, providing an opportunity for the audience to quiz the day's speakers, with the origin of feathers proving to be the main talking point. Joanne Norris then brought proceedings to a close by thanking the speakers for a day of excellent talks, and also the diligent subcommittee and other helpers who made the whole thing possible. Finally, those attendees with tired brains in need of refreshment repaired to the reception upstairs (at which point your reporter had to leave, but the event doubtless proceeded without incident. *It did, enjoyably – Ed.*).

I came away from the symposium thinking about the historical debate over whether dinosaurs were most like big lizards or scaly mammals. It seems this argument has been made obsolete by the reality that they were neither. The day's talks highlighted how unique dinosaurs were, in their morphology, behaviour and locomotion, and how this has in part driven the application of sophisticated statistical and modelling approaches to tackle the many complex questions that still remain surrounding their palaeobiology.

> Dr David O. Jones Dept of Geology, University of Leicester

Chairman's Report, given at the AGM on March 26th 2008

As I come to the end of my first year in the Chair, I can reflect on another busy but successful year, and I believe that we have continued to maintain the high standard that my predecessors Mark Evans and Andrew Swift set.

The year started off with a well organised field programme for which our thanks go to Helen Jones. In the main we were well treated by the weather despite the generally wet summer. The first field excursion, expertly led by Albert Horton, was to examine the building stones of the churches in the wolds of south Nottinghamshire. Numbers for this trip may have been affected by the poor forecast for the afternoon but an excellent trip was enjoyed, one of the highlights being the splendid tombs of St Mary and All Saints at Willoughby on the Wolds. The building stones theme continued for our next trip as we visited various localities in and around Northampton, skilfully led by Diana Sutherland.

The weekend field excursion to Norfolk followed at the end of June. From our base in Cromer, our leader Martin Warren led us on a traverse of the cliff sections at Trimingham, Overstrand and West Runton. The highlight for most was the visit to Happisburgh, where the recent discovery of a hand axe indicates that this is the site of the earliest known human occupation in northern Europe, and the lowlight was the dreadful downpour that preceded it. Andrew Swift ably organised the weekend excursion, and probably deserves a medal for calmly negotiating with the somewhat highly strung hotel landlady who had taken ownership of the hotel only the day before our party arrived.

On July 12th, Keith Ambrose led us around Cloud Hill Quarry at Breedon. With all the wet weather, we were extremely lucky that this evening visit was warm and dry. 17 members turned out, which proved quite tricky for Keith, as he struggled to move the party around the large quarry in his loaned (and ailing) BGS vehicle. The geology in the quarry was superb with the mineralisation being a prominent feature.



A calm sea at Cromer. Hard to imagine the destructive power of the waves that drive this coastimne backwards so rapidly

In August, Andrew Swift took us to Cauldon Low Quarry and railway cutting on the Staffordshire/Derbyshire border, where we saw Carboniferous Limestone heavily distorted by the earth movements of the Hercynian Orogeny in the main quarry, and later Namurian shales in the cutting. After a quick bite to eat in one of the most unusual pub in the whole country the 'Yew Tree Inn' – well worth a visit if you have never been – we drove the short distance to Dovedale where we were met by Mike Allen from the National Trust. Mike took us on a geowalk around the area where the pyramid-shaped Thorpe Cloud hill, a Carboniferous mud mound, made for an interesting talking point. In September, we had our annual joint meeting with the Warwickshire Geological Conservation Group to Mancetter Quarry and the Nuneaton Ridge. This was an extremely popular trip with over 50 people

from both groups attending. The final visit of the summer in mid October was to the BGS at Keyworth where Mike Howe and his colleagues demonstrated their new 3D holographic technology and allowed us a privileged view of the palaeontological collections.

The winter programme was equally successful with probably our highest attendances recorded for some years (average attendance was 48). There was one enforced last minute change in proceedings and we are extremely grateful to Frank Ince who stepped in at short notice to talk on the mineralogy of Newhurst Quarry at Shepshed on January 31st. The Parent Body talk, given by Professor Cynthia Burek on January 7th on the role of women in geology, was particularly apt especially with the change in demographics of the Section's committee. The Member's Evening in February was well supported with four eloquently presented talks by Trevor Ford (Golconda mine), Andrew Swift (Section C in 2007), Mark Evans (on the new geology galleries at the museum) and Bruce Smith (Peruvian adventure).



Group before the Baldwin Lecture. Nigel Trewin is 2nd from right.

On February 27th we hosted the Baldwin Lecture sponsored by the Palaeontological Association when Professor Nigel Trewin enlightened us about the ecosystem preserved in the Rhynie Chert. The Saturday Seminar on 15th March demonstrated our knack of identifying the cutting edge of science when an impressive team of experts, using the latest computer technology, showed just how dynamic dinosaurs were. It was an excellent day of talks followed by a convivial reception, although attendance was slightly down on previous years, for unknown reasons. A big thank you goes to the sub-

committee and other helpers for all their hard work in organising this years event.

The Section's website www.charnia.org.uk continues to be a great source of information and is diligently maintained by our webmaster Dennis McVey. Andrew Swift has more than met the challenge of producing and editing our newsletter Charnia, with improved quality, numerous illustrations and new features such as meet the membership - we are eagerly awaiting the next instalment.

Other Section activities this year included selling the Building Stones of Leicester book published in March 2007, these have sold steadily throughout the year. Trevor Ford also donated his reprints of a guide to the Geology of Bradgate Park, which the Section has sold at £1 each to boost funds.

On a very sad note, the Section lost one its long term members this year, Pauline Dawn. Pauline was a friend to many of us and a familiar face at Section meetings, and will be sadly missed.

This year saw quite a big change in the make-up of the committee, with Mark Evans as Vice-Chairman, Andrew Swift as Charnia Editor and Kay Hawkins in the role of Publicity Officer. Fiona Barnaby enjoyed a successful first year as our new Secretary, and I have to thank her and all the other committee members for doing their usual efficient job in administering the Section. Thanks go too to retiring Student Representative Iain Graham, who is going to search for gold.

Dr Joanne Norris

The Carboniferous Limestone in NW Leicestershire and beyond

Since the Section visited localities exposing Carboniferous Limestone twice last year I thought that members might welcome a reminder of some not too distant exposures that are worth a visit.

Firstly, the southernmost quarry near Gracedieu Priory, which was given detailed treatment in the 1968 *Geology of the East Midlands* (eds Sylvester-Bradley & Ford). It is reached by taking the A512 from M1 junction 23. After passing the Priory on your left look for the car park entrance by the Bulls Head, just before the turn for Thringstone. Take the path at the top left of the car park following signs for the Priory. After the second railway arch (the London and North Western branch from Whitwick to Loughborough – a pub called The Station on the A6 marks its Loughborough terminus), immediately take a path to the left. After some negiotiating of fallen trees the quarry is reached. Some of the face is covered with soil or vegetation and is

somewhat difficult to access when wet, but since the beds are slightly folded, a section can be studied (binoculars might help). Much of the face is dolostone with some thin softer sandy layers, overlain by rubbly breccia of Triassic age.

The area south of the priory is worth a visit and has several exposures of dacite, e.g. by the lane at 435174 and beyond in Coderman Wood. Pyroclastic agglomerate can also be seen e.g. at 441169. To reach it, return under the first railway arch and continue straight on at the next. An alternative car park is at 442169.

Secondly, Dimminsdale Nature Reserve. Follow signs for Staunton Harold Ferrers Centre (north entrance) and park at the Severn Trent car park just before the head of Staunton Harold reservior. Walk down the lane and the reserve entrance is on the left. Alternatively, park in the Ferrers Centre and walk back down the north entrance road until you can take a footpath to the right to the reserve (the land disturbance was caused by lead mining). A path leads around the lake which fills the old limestone quarry. There are remains of lime kilns and exposures of limestone, shales and the overlying Ashover Grit. If you walk from Staunton Harold to Dimminsdale you will be close to the Thringstone Fault, with Coal Measures to the left and Ashover Grit on the right. I think that the disturbed ground hereabouts is due to coal mining, in spite of what The Geology of the East Midlands says!

Lastly, the quarries at Ticknall, just over the border in Derbyshire. There is a car park (signposted) by the church hall in Ticknall just west of the entrance to Calke Abbey. Walk up the Abbey entrance road to a footpath on your left which follows the old tramway route – it goes under the road by tunnel. The pathway goes through the woodland to a farm road with lake filled quarries at either side (orchids in June, clematis later). There are several exposures of limestone on either side of the path and there is a fine section near the road, which has been restored. In places the overlying Ashover Grit can be seen. There are several paths to Calke Abbey where the restaurant provides excellent crisps from Uttoxeter and beer from Swadlincote!

Further reading:

Mines of Ticknall and Staunton Harold. Howard Usher *The Ticknall Tramway.* Geoffrey Holt Both produced by the Ticknall Preservation Society

Bruce Harris

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	Cash in hand 102.72				1	
	Halifax 26.00			Geologists' Assn	33.00	33.00
	H&R 803.01			"" " Ins	137.00	136.00
	Lloyds TSB 930.54	1862.27	1599.72	Charnia Printing	226.55	83.44
	Subscriptions			" Postage	69.00	66.19
	44 @ £7: 23 @ £10:			" Stationery	24.77	15.87
	14 @ £5 1 @ £8	616.00	609.00	Membership cards	n.s.	22.00
	Gift Aid	416.85	-	Secretary Exes re 06- 07	25.90	43.22
	Refreshments	41.41	33.51	" " re 07-08	28.74	6.00
	Subs. paid 2 x	34.00	56.00	Refund on Subs.	14.20	37.00
	Building Stones of Leic.	139.00		Treasurer Exes	9.48	
	Geology Bradgate Park	13.00	-	Chairman Exes	14.20	
	Donated map	3.00	-	Field Sec Exes	23.04	
	Bank Interest	21.14	10.53	Field Trip Exes	49.57	
	Saturday Seminar 2007	2492.50	917.00	Saturday Seminar 2007	2094.70	482.41
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				Speakers Exes	115.30	135.05
				Joint meeting	50.00	50.00
				Internet Domain	39.48	39.37
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Inside covers

This edition's centre spread consists of four images kindly forwarded by Helen Boynton (scans provided by John Murray) of Charnwood Lodge in the north west part of Charnwood Forest. As many of you know, most of the buildings, including the old Hall, were demolished in the early 70's, so these photographs are important records of a now disappeared scene. The semiwild Charnwood Lodge area is one of the last large areas of relatively unspoiled country in the Forest and its aspect gives some idea of what the whole of Charnwood would have looked like centuries ago. It is not open to the general public, and therein lies the key to its survival. It is the eternal conundrum that open access is (arguably) desirable so that all can enjoy the scenery and landscape, yet by denying the public access these very features can be preserved and conserved by removing the threat of wear and tear, and, sad to say, abuse and desecration. It is hoped that in a future edition a more comprehensive guide to the rather special geology at Charnwood Lodge will be presented.



The rugged terrain of Charnwood Lodge in 2008, with spectacular 'bomb rocks' in the foreground

Subscriptions

Although subscriptions aren't due until 1st October 2008, it is always a great help to us if members make their renewals on time. Therefore, please can I ask you to complete the enclosed membership form and send to me as soon as possible. Can I also encourage you to complete the Gift Aid declaration if you are a UK tax payer. Members who have completed this in the past are not required to fill this in again unless, of course, your personal (tax) circumstances have changed and result in a change to your Gift Aid declaration.

Members who pay by standing order please can you still send the form back so that we know of your intention to pay in this way. Also please check with your bank before taking out duplicate standing orders.

Eileen Johnson



Charnwood Lodge views 2



Officers and Committee 2008 – 2009

Life President: Bob King The Oak Longdon TEWKESBURY Glos GL20 5SE

Chair: Dr Joanne Norris 208 Milligan Road Aylestone LEICESTER LE2 8FD 0116 2833127 j.e.norris@ntlworld.com

Secretary: Fiona Barnaby Cuckoo Cottage 22 Church Lane Dingley MARKET HARBOROUGH Leics LE16 8PG 01858 535404

Field Secretary: Helen Jones Ashlawn Forest Drive Kirby Muxloe LEICESTER LE9 2EA 0116 2392872 helenjonesx@hotmail.com

Publicity Officer: Kay Hawkins Department of Geology University of Leicester University Road LEICESTER LE1 7RD 0116 2523369 kh62@le.ac.uk Life Vice-President: Dr Trevor Ford OBE 21 Elizabeth Drive Oadby LEICESTER LE2 4RD 0116 2715265

Vice-Chair: Mark Evans Leicester Museum & Art Gallery New Walk LEICESTER LE1 6TD 0116 2254904 mark.evans@leicester.gov.uk

Treasurer: Eileen Johnson Rosedean Park Lane BAGWORTH Leics LE67 1BB 01530 230476

'Charnia' Editor: Andrew Swift 208 Milligan Road Aylestone LEICESTER LE2 8FD 0116 2833127 andrew.swift001@ntlworld.com

> Webmaster: Dennis McVey 130 Carisbrooke Road Knighton LEICESTER LE2 3PE dennis.mcvey@mira.co.uk

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Committee: David Baines, Margaret East, Dr Mark Purnell

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