CHARNIA



Bantycock Quarry, Newark, venue for the July 7th excursion

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

January 2012

www.charnia.org.uk

Editorial, January 2012

Who knows where the time goes? is a lovely wistful song that many of you will know by Sandy Denny, that somehow encapsulates the bittersweet melancholy that marks the unstoppable passage of time, wherein all things must pass (to borrow another song title). Recent events seem to have concentrated my mind on the ageless truth of the phrase tempus fugit, which really is the theme of this editorial. Some of the changes wrought by time are perforce sad, and since my last epistle we have lost one of our most popular and dedicated members, John Dickinson. John had been unwell for some time, but always bore his troubles with fortitude and he continued to attend meetings despite them. His sharp and enquiring mind was quick to see into the real issues behind our lectures and he was always ready with an insightful question, and was usually first in line to volunteer a talk (most often about his beloved old Cornish mines) for the Member's Evening. He and Ann were familiar figures on the weekend field trip, and these won't seem quite the same without him. Its easy to say the words we will miss him, but in this case they really are true. Arthur Cruickshank, who worked until recent years at the Museum and was a most respected researcher, is another recent loss, and while he was not an active member of the Section, he would always say yes if we asked him to give a lecture or speak at a Saturday School. And John Aram, similarly, was not one of our members, but was another who was only too pleased to lead field trips or give us a talk. Indeed, he was going to lead an excursion for us last season until death intervened.

As I write, its crisp and cold, with everything thrown into sharp relief. It never looks like a day for being out, but, as I've written before, it actually is. There's no better time for a walk or a geological expedition. Those of you who are photographers know only too well what opportunities are offered on a frosty, crystal clear winter day. So don't waste the winter, get out there with your hammers and cameras, after all we know full well that the much anticipated Spring and Summer will be disappointing!

This year's summer programme is included in this Charnia and looks enticing. Arrangements for the weekend excursion to St Davids, Pembrokeshire are well advanced and field secretary Helen Jones would like all prospective attendees to get in touch quickly, as hotel rooms need to be confirmed and deposits paid. Please do this now if you are intending to participate.

Lastly, I hope you like the illustration of 'Charnian Life' that Tina Negus kindly offered for this issue, which you will find later on in these pages, her imaginative take on life at the bottom of a Precambrian sea. If anyone else with an artistic bent would like to submit their geological drawings, I'd be pleased to receive them with a view to publication.

Andrew Swift

Winter Programme 2012

All talks are held in Lecture Theatre 3, Ken Edwards Building on the main Leicester University campus, except where stated. Refreshments served from 7.00pm Details: Mark Evans. New Walk Museum, 0116 2254904

Wednesday January 11th

Dr David M. Unwin (Museum Studies Dept., Leicester University). Frank, Mrs T and Xiao D – how *Darwinopterus* from the Jurassic Tiaojishan Formation of north east China has transformed our view of pterosaurs

Wednesday January 25th

Professor Robert Cywinski (School of Applied Sciences, Huddersfield University). Towards an alternative nuclear future?

Wednesday February 8th Dr Joe Angseesing (Gloucester). Bivalves vs Brachiopods

Wednesday February 22nd Member's Evening, New Walk Museum

Wednesday March 7th Ian Brown (Lafarge Aggregates Ltd). Essential minerals from the East Midlands

Wednesday March 17th Annual Saturday Seminar, LT1 Bennett Building, University of Leicester. Geodetectives: unravelling the Earth's mysteries

Wednesday March 21st Annual General Meeting and Chairman's Address Mark Evans (Senior Curator, New Walk Museum)

Abstracts for Winter Programme

Wednesday January 11th

Frank, Mrs T and Xiao D – how *Darwinopterus* from the Jurassic Tiaojishan Formation of North-East China has transformed our view of pterosaurs

Dr D. M. Unwin Department of Museum Studies, Leicester University

The discovery by Chinese farmers in the winter of 2008-2009 of the pterosaur *Darwinopterus* has had a profound impact on our understanding of the biology and evolutionary history of these Mesozoic flying reptiles. Now known from more than 20 specimens, many of them complete and well preserved, *Darwinopterus* forms part of the 'Daohugou Biota', a rich Middle/Upper Jurassic continental fossil assemblage that contains plants, insects, amphibians, feathered dinosaurs and mammals. This biota is preserved in finely laminated lacustrine beds of the Tiaojishan Formation and lateral equivalents in north-east China.

The most striking feature of *Darwinopterus*, adults of which reached about 0.9 m in wingspan, is the presence of a highly evolved skull and neck like that found in pterodactyloid pterosaurs, while the rest of the skeleton, with its short wrist, long tail and long fifth toe, is identical to that of earlier, less advanced, long-tailed 'rhamphorhynchoid' pterosaurs. *Darwinopterus* thus provides the first direct evidence of how pterodactyloids evolved from rhamphorhynchoids. Surprisingly, rather than slow and piecemeal in nature, as might be expected, this process seems to have been both rapid and modular, with many important anatomical changes taking place very quickly and seemingly in concert.

An individual of *Darwinopterus* preserved with an egg, 'Mrs T', demonstrates that unlike birds, which lay relatively large, hard-shelled eggs, pterosaur eggs, like those of some extant reptiles, were relatively small with pliable shells. Combined with other individuals of *Darwinopterus* Mrs T provides what is probably the best example yet found of sexual dimorphism in a Mesozoic reptile. Mrs T, shown by her associated egg to be the female morph, has a relatively broad pelvis, but lacks a cranial crest, whereas several other individuals, interpreted as the male morph, have a narrower pelvis and a well developed flange-like crest on the skull which, in life, was further extended dorsally by soft tissues. This pattern of character distribution

suggests that the principle function of the crest in *Darwinopterus* and, by inference, the many other crested species of pterosaur, was for display: either to intimidate males or to attract females, or possibly both. We can be fairly confident, therefore, that the remarkable anatomical diversity of pterosaur cranial crests reflects the operation of sexual selection. Moreover, since crests occur in nearly half of all pterosaur species it would seem that this type of selection played a significant role in pterosaur evolution.

Wednesday January 25th Towards an alternative nuclear future?

Professor Robert Cywinski School of Applied Sciences, University of Huddersfield

There is considerable debate about whether the twin global crises of energy shortage and climate change can be mitigated by nuclear power. Indeed, there is continuing concern about the safety of uranium and plutonium fuelled nuclear reactors, the management of nuclear waste and the issue of proliferation. But what if we had a nuclear fuel that was low risk, low waste and sustainable? Surprisingly such a fuel does exist: it is thorium. In this lecture I will discuss the need for nuclear power as an essential part of a balanced energy economy, and suggest ways in which thorium could be used to fuel an alternative, and a safer, nuclear future.

Wednesday February 22nd

Bivalves vs Brachiopods

Dr Joe Angseeing, Gloucester

The bivalves and brachiopods are major groups of animals with comparable morphology related to a similar mode of life and not to a common ancestry. The two groups have fared differently through the Phanerozoic, with the brachiopods more numerous and diverse in the Palaeozoic but declining as the bivalves supplanted them. This talk is focussed on three questions: Why the early dominance of the brachiopods? Why have the bivalves been better competitors? How gradual was the takeover?

Wednesday March 7th Essential minerals from the East Midlands

Ian Brown Lafarge Aggregates Limited

The East Midlands of England possesses a diverse geology which has been quarried for industrial uses since at least Roman times. Currently the area produces sand and gravel from the river valleys for local needs. Derbyshire limestone contains around 98% calcium carbonate, this is distributed around the country in the form of lime, cement and industrial minerals. The four large granite quarries of Leicestershire are the nearest source of hard stone to London. Crushed granite has been supplied by rail to the huge construction markets of the South East of England since the middle of the nineteenth century. This illustrated lecture will describe the basic geology and history of quarrying in the area and explain some of the modern techniques now used in the industry.



In a Lafarge quarry



Charnian Life by Tina Negus



Roger Mason talk October 19th 2011



At the Christmas Meeting December 14th 2011

Summer Programme 2012

Please note that all field excursions are subject to change in the event of unforeseen circumstances.

Closely supervised children may be welcome at events marked with an *. Please contact the field secretary if you wish to bring children. All trips are confirmed and on a Saturday unless indicated.

April 14th The Roaches area, Staffordshire. Sandstone scarps, landslip and Coal Measures. Rough terrain. Leader Albert Benghiat *

May 5th Building stones of Warwickshire. Baddesley Clinton manor house plus churches. Meet 10.30 am at B. Clinton. Leader Maurice Rogers *

Friday June 1st – Sunday June 3rd St Davids, Pembrokeshire. Leader Charlie Bendall (Aberystwyth University)

June, evening excursion. Possibly Mountsorrel Quarry. To be confirmed.

July 7th Bantycock Quarry, Newark. Late Triassic Mercia Mudstone and Penarth Grps. Leader Andrew Swift

August 11th British Geological Survey, Keyworth. Charnwood fossil material. Leader Phil Wilby *

September 8^{th} Possibly volcanics of Derbyshire. Leader Mike Allen. To be confirmed *

October 13th New Walk Museum, Leicester. N.B. rock store may not be accessible on a Saturday. Leader Mark Evans *

Field Excursion Report

Dudley Museum and Wren's Nest, October 8th 2011

The Summer 2011 Field Programme ended with a visit to Dudley Museum and nearby Wren's Nest. Six doughty members braved a biting wind and overcast skies to venture into the environs of Dudley. At the Museum we were joined by Mr Graham Worton, Keeper of Geology, who introduced us to the building, a former art school built in the Victorian age. Graham led us through the galleries explaining how he was in the process of updating many of the displays.

For many years Dudley was the focus of attention of the geological community, primarily when Murchison (ably supported and encouraged by Mrs Murchison) based much of his research into the Silurian system on the limestone inliers of Wren's Nest and Castle Rock. He shipped out the great and the good of the Victorian scientific community on a barge to Dudley paying a 'hog' toll (as the toll collector didn't have a category for scientists they were logged as hogs!). Wren's Nest has some 600 species represented in the fossil record whereas Wenlock has in the region of 400 species and Graham felt that but for politics this part of the Silurian System should have been named the Dudley Limestone.

The industrial heritage of Dudley also has a geological link with the limestone being used a flux to take out the impurities during the iron smelting process. This process was improved by Dud Dudley the 8th son of the Earl of Dudley. It was this great demand for limestone that led to the development of caverns and mine shafts, now largely back filled, under Wren's Nest. We saw some superb mineral specimens including a fluorescing mammoth's tusk and a huge model of a mammoth (a relic from a film set) which had to be 'butchered' to get her up stairs!

We were privileged to share some of Graham's current research with microfossils, and looked at what appeared to be conodonts, but which were actually the mouth parts of, he suggested, annelid worms... if only he could find the soft body parts with the assemblages in the jaw.

Of course no visit would be complete without the Dudley Bug, and specimens were retrieved from the safe and shared around. We marvelled at such fine specimens of what has become the Holy Grail for one or two members! Now we knew what we were looking for. Graham also showed us the head piece or cephalon of a trilobite found recently by an amateur. This specimen appeared to have eyes on stalks and rear facing spikes protruding from the head shield. So not just the Dudley Bug to find. Having run an hour over our allotted time we thanked Graham for a fabulous and informative morning and had a brief lunch and drink in Dudley Town Centre.

2.15 pm found us parked up at Mons Hill College to meet Robert Earnshaw, Warden of Wren's Nest. He asked us how long we would like to walk for and I suggested an hour. Robert explained how the caverns and shafts under Wren's Nest had become unstable and they had been remotely backfilled with concrete to try to stabilise the situation and make the terrain safe. We looked at what remains of the Seven Sisters and noted the SW/NE dip (a result of the Caledonian Orogeny) of the limestone and its transitions from massive blocky facies to shales to nodular and so on representing tectonic and environmental factors. But, of course, it was the myriad of beautifully preserved brachiopods, bryozoa, corals and other fauna including fragmentary trilobites that took our attention.

We thanked Robert for the second half of a perfect day and the excursion concluded at 4.45pm.

Helen Jones

The search for more Charnian fossils

Helen Boynton

I have always been puzzled as to the whereabouts of the rocks quarried from North Quarry on Charnwood Forest Golf Club. If these could be located more Ediacaran fossils might be found, to add to the collection in Leicester Museum and casts at BGS. This last summer was dedicated to a search for the missing material. It was estimated that c3000 tons of rock was extracted, which was probably enough to build a couple of houses and quite a considerable length of wall.

The North Quarry is situated on the eastern side of Charnwood Forest Golf Club, adjacent to Pocket Gate Lane (now Brook Road), in rocks high in the Precambrian, which consist of greenish/grey banded slates of which the bands of darker material become closer together towards the top of the succession. These, compared with the more purplish slates of the Brand Series in the Cambrian, are good markers when searching in walls and fields. The ridge on which the Quarry was opened is part of a faulted inlier which extends from Pocket Gate Lane, where it is cut off by a transverse fault and on the southern side by another transverse fault. It was very lucky that in 1956 Tina Negus saw a *Charnia masoni*, a discovery which was later confirmed by Richard Blachford, Roger Mason and Dick Allen. It will be very interesting to learn the results of the 10.5 metre core put down by BGS in February 2011 in the floor of the quarry.

Charnwood Forest Golf Club was situated on the Beaumanor Park Estate where a stone house was constructed in the c.13th century, which was later demolished. This was followed by at least two more Halls, a brick one in the Georgian period and a second one, also of brick, in Victorian times, so the ridge of Precambrian rocks could have been vital for building material since c.1200. The date of the closure of the Quarry was c.1847 and its opening, possibly c.1200, or it could have been excavated after 1829 when Charnwood Forest was enclosed and there was a boom in building of houses, walls and roads (the local parishioners had to lay out their own roads).

So my search started, looking at buildings and walls on the Old Beaumanor Park Estate. Barrow-on-Soar originally marked the eastern extent of the Beaumanor Park Estate, so an examination was started with photographs of the local station (now demolished), built 1840, for the Midland Railway Co. This building however was found to be made of brick like many small stations, e.g. Sileby on this early line. Houses were then examined, including lodges for the Estate, there is one just outside Loughborough at Mecklin Wood, a second opposite the back entrance to Beacon Hill (adjacent to the Golf Club) and thirdly, the main one is in Old Woodhouse village. These were all obviously built of purplish Swithland Slates and did not contain many fossils. They had dates of c. 1846 and would have been built at the same time as the present brick built Beaumanor Hall, so there were few Precambrian fossils to be found here. Most of the local houses at Woodhouse Eaves and Old Woodhouse appear to have been built from local Swithland Slates quarried from near the former village.

Attention was then turned to local walls and farmhouses near the North Quarry. Again there was no luck and although the wall along Pocket Gate Lane has been examined many times by numerous people nothing was found. The field adjacent to Pocket Gate Lane was then "walked" and near the Quarry there were quite a lot of small boulders, which were however weathered and covered with a reddish-brown coating of soil. One, however, did show the very fine banding which is present near the top of the Quarry, from where, no doubt it came. Another small cobble was a very fine quartz rich conglomerate from the Hanging Rocks (Cambrian), of which there are several outcrops on the Golf Course, but again no fossils were found.

The location where any possible fossils were seen, was on the wall of the Long Hill Farm on the northern slopes of Beacon Hill and overlooking the Golf Course and Quarry. Here are a number of small ovoid discs which possibly came from Beacon Hill Beds, as they were more reminiscent of these lower beds. From the area around North Quarry the search extended to the vicinity of The Outwoods, where particular attention was given to the stone walls in and around the car park. On a low wall surrounding the Oak tree in the middle of the car park is one stone with well-defined bedding. The

uppermost plane, which is visible, may show a hollow stem with a side branch. This is being researched at present.

So the search for Charnian fossils on the eastern side of the anticline proved a little disappointing, but one day, a lucky person, just like Tina Negus, will find something which did come from the North Quarry or The Outwoods and that will be a fantastic find worth waiting for!

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Roger Latham, Treasurer



At the Christmas Meeting December 14th 2011

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