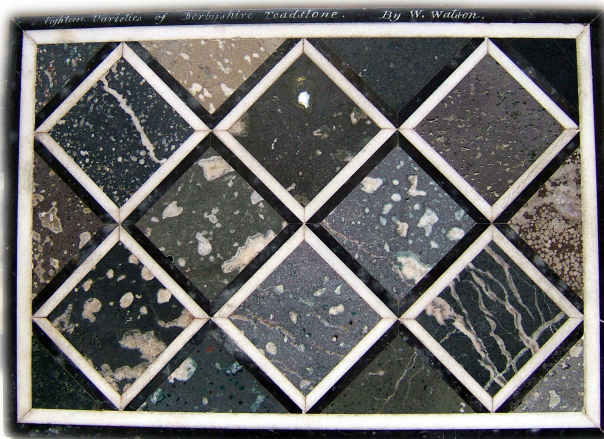


# CHARNIA



Two of White Watson's famous tablets (Chatsworth Colln)

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

**[www.charnia.org.uk](http://www.charnia.org.uk)**

**September 2008**

## Editorial

You know what's its like, that is if you use public transport as I do, you wait 20 minutes for a bus service that allegedly runs at seven minute intervals, and then three turn up. Well, this edition of Charnia is a bit like that. I, in common with most newsletter or journal editors, have a mantra that I deliver from time to time to any passing member or members, that goes something like, 'If you have anything you'd like to submit for Charnia, then I'd be only too grateful.....' The take-up rate for such requests is, statistically, negligible. However, for this edition I have received, well, almost several articles, more or less freely offered, and I have had to actually hold items over until the next edition in January. Long may this trend continue – and that means you! Nevertheless, for this edition, in order to include everything of importance, including a detailed abstract (in reality more a small paper) of the GA anniversary lecture by Jim Rose on November 5<sup>th</sup>, I've had to sacrifice some of the illustrations I normally include.

Usually, the interval that contains the summer programme is my favourite time of the Section year, because its then that we get to go into the field and see lots of lovely 'live' geology. But this year for nefarious reasons my (and the Chairman's) attendance has been, frankly, poor. Please don't feel we've fallen out with you, it just seems that on every excursion weekend things like new kitchens or, in the Chairman's case, long work-related secondments away from Leicester, have intervened. Unfortunately, it looks like we will also miss the last one to the Lapworth Museum, as we will be returning that day from the north.

We of the Saturday Seminar sub-committee have now had a few meetings, and I'm pleased to announce that we will indeed be presenting a meeting in March next year that looks in detail at some of the great historical figures of our science and their pioneering work, including of course Darwin (as geologist) in his 200<sup>th</sup> anniversary year. We also plan to integrate into the programme the current standing and applications of the inspirational ideas of these great men. We hope to inveigle some of the big names into speaking at the seminar and have feelers out at this very moment. Watch this space, as they say.

Finally I'm sure you all join with me in wishing a speedy recovery to committee member Dick Aldridge, who was taken seriously ill towards the end of August. We hope to see him back amongst us soon.

Andrew Swift

## Summer Programme 2008

We have just one remaining excursion this season, to the Lapworth Museum at the University of Birmingham, on Saturday October 11<sup>th</sup>. Our hosts at this most interesting museum will be Professor Paul Smith and curator Jon Clatworthy. Let Helen (Jones) know if you wish to attend, **0116 239 2872**, [helenjonesx@hotmail.com](mailto:helenjonesx@hotmail.com)

## Winter Programme, 2008-9

**7.30pm in Lecture Theatre 3, Ken Edwards Building, main University of Leicester campus, except where stated. Refreshments served from 7.00pm.**

**Details: Chairman Dr. Joanne Norris or Editor Andrew Swift, 0116 2833127, [j.e.norris@ntlworld.com](mailto:j.e.norris@ntlworld.com)**

### 2008

#### **Wednesday October 8<sup>th</sup>**

Dr Stewart Fishwick (Department of Geology, University of Leicester): **The African continent: seismological studies of the upper mantle and the relationship with surface geology**

#### **Wednesday October 22<sup>nd</sup>**

Dr Michael Howe (British Geological Survey, Keyworth): **Preserving our geological heritage: the curation of fossil and mineral collections**

#### **Wednesday November 5<sup>th</sup>**

Geologists' Association 150<sup>th</sup> 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 19<sup>th</sup>**

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 3<sup>rd</sup>**

Dr Giles Miller (Natural History Museum, London): The use of Synchrotron radiation to examine micropalaeontological specimens

#### **Wednesday December 17<sup>th</sup>**

Christmas Meeting, **New Walk Museum, Leicester**

**2009**

**Wednesday January 14<sup>th</sup>**

Professor Gerry Slavin (Professor of Histo-Pathology (ret'd), Barts, London):

**Geology and disease**

**Monday January 26<sup>th</sup>**

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 28<sup>th</sup>**

Professor Stephen Hesselbo (Department of Earth Sciences, University of Oxford): **The geological record of massive volcanism and large meteorite impacts: a view from the British Isles**

**Wednesday February 11<sup>th</sup>**

Members Evening, **New Walk Museum, Leicester**

**Wednesday February 25<sup>th</sup>**

Dr John Bridges (Department of Physics and Astronomy, University of Leicester): **The geology and evolution of Mars**

**Wednesday March 11<sup>th</sup>**

TBC

**Saturday March 7<sup>th</sup>**

Annual Saturday Seminar, University of Leicester, 9.30 am – 5.00 pm:

**Darwin and the great pioneers of geology: inspirational ideas and contemporary relevance**

Wednesday March 25<sup>th</sup>

Annual General Meeting, and Chairman's Address

Dr Joanne Norris (Halcrow Group Ltd., Peterborough). **Rocky tales of a geotechnical engineer**

**Abstracts for Winter Programme talks (up to Christmas '08)**

**October 8<sup>th</sup>**

**The African continent: seismological studies of the upper mantle and the relationship with surface geology**

**Dr Stewart Fishwick (Department of Geology, University of Leicester)**

The African continent remains a challenging location for understanding the structure of the upper mantle and the dynamics of the Earth. Since Holmes (1944) described the long-wavelength topography of Africa in terms of basins and swells there has been interest in relating the variation in relief with dynamical processes in the underlying mantle. However, for seismic investigations there are a limited number of permanent seismic stations and, presently, publicly available data from temporary deployments are only available from eastern and southern parts of the continent. Here, a new tomographic model of the uppermost mantle will be presented with discussion on how the observed wavespeed anomalies may be related to larger dynamical processes and the topography of parts of the African continent. Potential for future seismic experiments in Africa will also be discussed, along with some thoughts on possible logistical difficulties!

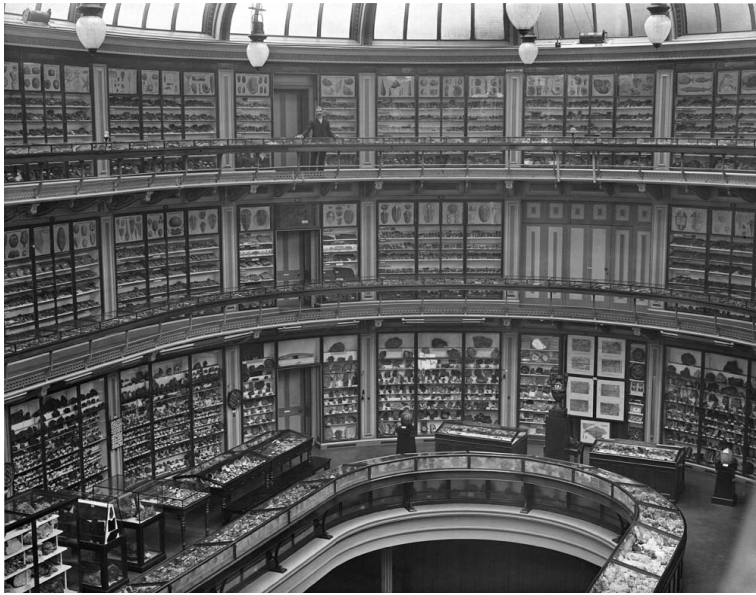
**October 22<sup>nd</sup>**

**Preserving our geological heritage: the curation of fossil and mineral collections**

**Dr Mike P. A. Howe (Chief Curator, British Geological Survey, Keyworth, Notts)**

The collecting of geological samples probably goes back to the origin of mankind, but the oldest surviving intact collection is thought to be that of Dr John Woodward (1665 – 1728). Parts of the collections at the British Geological Survey predate the founding of the Survey in 1835. They are well documented from 1851 onwards, with the opening of the Museum of Practical Geology, Jermyn Street, London (see photograph).

Over the years, various good practice standards have evolved, some of which are as relevant to small private collections as they are to major national collections. Subjects that will be covered include fieldwork documentation, accessions, registration, conservation, curation and databasing. Fossils and mineral specimens must be considered a limited and finite resource. Specimens should never be removed needlessly, they should always be carefully documented, and thought must be given to the ultimate fate of the collection.



Museum of Practical Geology, Jermyn Street, London. 1851 – 1935  
BGS Photograph P640481 © NERC

## November 5<sup>th</sup> Geologists' Association 150<sup>th</sup> Anniversary Lecture

### The landscape, environment and climate of the earliest Humans in northern Europe

Professor Jim Rose

Department of Geography, Royal Holloway, University of London

Recent work has demonstrated that Humans lived in Britain more than 700,000 years ago some 200,000 years earlier than previously believed. This is prior to the earliest known lowland glaciation of Britain and at a time when Britain was linked with the continent. This lecture sets out to explain the evidence upon which this interpretation is based, the reasoning behind the age and the nature of the environment associated with human occupation.

#### **Detailed Abstract:**

There are numerous records in eastern England for human activity in Britain prior to Marine Isotope Stage 12 (c. 450,000 yrs BP) (see Wymer (1985) and Rose (1994, 1995) for geological context and Parfitt *et al.* (2005) for archaeological context). The most famous of these sites, at Boxgrove

(Roberts *et al.*, 1994), is in southern England beneath periglacial slope deposits which are, at present, of little value in providing a time (lithostratigraphic) control, but the majority of the sites are in eastern and midland England beneath glacial deposits. These glacial deposits are of critical importance to this interpretation as they preserve the evidence of human activity and environment to a quite a remarkable degree, and by correlation with the age of the glaciations, the overlying glacial deposits provide a time control for the age of glaciation.

The evidence for human activity in eastern and midland England is associated with deposits of two major river systems that flowed eastward to the Southern North Sea delta: the Bytham River which was the largest river in Britain prior to lowland glaciation, and the Ancaster River. Sites are numerous and fall into two groups: those which included derived human artefacts and thus only provide a minimum age for the presence of glaciation, and those that are associated with the period of occupation, taking the form of past floodplain surfaces upon which the humans lived and within which the critical evidence was buried as floodplain aggradation continued. Critical sites associated with habitation include High Lodge, Happisburgh and Pakefield.

Refining the age of the human presence has proved difficult because of the geochronometric methods available to date the period of time concerned. With the exception of geomagnetic polarity which has shown that all the sites studied so far are normally magnetized and therefore younger than 780,000 yrs BP, only amino acid racemization (AAR) covers the age range concerned, but unfortunately this is near the limit of the method and is not able to discriminate with confidence the different periods of human occupation (Parfitt *et al.*, 2005). The classical biostratigraphic methodologies are either fundamentally flawed (pollen assemblage stratigraphy) or are based on empirical evidence that could change the interpretation with any new discovery (First and Last Appearance Datums of rodent species (FAD, LAD). At present the association of *Mimomys pusillus* with the archaeology at Pakefield supports an age of c. 700,000 for this site, and the presence of *Arvicola cantiana terrestris* with the archaeology at Happisburgh is considered to indicate a younger age but still older than MIS 12. These age allocations depend upon long-distance correlation and could be revised or even shown to be of different ages with any new discovery or by an application of geochronometric control.

The association of the human artefacts with the river deposits has provided a new method by which it is possible to determine the approximate age of the archaeology in absence of geochronology. This method depends on

lithostratigraphy and geomorphology, and has a sound conceptual basis in the form of major climate changes forcing the behaviour of major physical systems. Dating is provided by the fact that the major climate events occur at the eccentricity forced (100 ka) Milankovitch orbital timescale (Martinson *et al.* 1987; Shackleton *et al.*, 1990) and the systems that respond are: i) global temperate-climate high sea-level reflecting substantial melt of major ice sheets; ii) net aggradation of river terrace deposits in the lower reaches of large rivers that reflect substantial quantities of cold climate sediment. This method is particularly effective when the aggradations can be separated by erosion-driven uplift; iii) major expansion of cool temperate latitude ice-sheets. These three lithostratigraphic methods have different levels of robustness with (i) being especially robust and (ii and iii) having a high order of confidence with the level of confidence reflecting the size of the river system and the size of the ice-sheet (Lee *et al.*, 2004). Because the sediment that is produced by these events hosts the materials that contain the archaeology and material suitable for dating, these events can be linked readily to geomagnetic polarity, AAR or any other appropriate dating method.

The lithostratigraphic and geomorphological evidence for these events tuned to the Milankovitch timescale and geopolarity indicates that the earliest hominids occupied the Bytham River floodplain at Pakefield about c. 750,000 years ago in late MIS 19 (Lee *et al.*, 2006; *contra* Parfitt *et al.*, 2005). Similar evidence from in Bytham river sediments (Rose, 1994, 1995) and Ancaster river catchment floodplain sediments at Happisburgh indicate occupation at about 680 ka in MIS 17 (Lee *et al.*, 2004), whereas at High Lodge in the lower middle part of the Bytham river catchment (Ashton *et al.*, 1992), human occupation occurred c. 500,000 years ago (MIS 13).

The environment at the time of occupation can only be derived from those sites in which the archaeology is directly associated with the floodplain sediments. At Pakefield the soil and biological evidence points to the occurrence of a period of mediterranean-style seasonally warm and dry climate (Candy *et al.*, 2006). At High Lodge the evidence points to cool temperate climate conditions, cooler and possibly more continental than the present day (Coope, 1992; Hunt, 1992). The work from Happisburgh shows temperatures rather cooler than at the present day, especially for the winters (Coope, 2006). At each of these sites the evidence may only represent a very short period of time, and the climate represented may only represent a brief instance in the long-term climate changes of the early Middle Pleistocene. However, all sites indicate high bioproductivity with the presence of large

mammals (Parfitt *et al.*, 2005), single thread river systems and relatively stable land surfaces.

Geodynamically and geomorphologically there is sound reasoning for the presence and survival of human remains at this period of time. Firstly, the British land area was part of the continental land area with the southern North Sea delta extending from the eastern part of East Anglia to the area of Denmark and northern Germany. Secondly the earliest Happisburgh (MIS 16) and Anglian (MIS 12) glaciations crossed the region with exceedingly low basal shear stresses, and so failed to erode the underlying landscape, instead providing a layer of till that protected the underlying archaeology from subsequent erosion. Only now, with accelerated coastal erosion and aggregate extraction have these remains been revealed.

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*In order to allow two complimentary pieces to appear alongside each other, I've interrupted the abstracts to insert an article by Ann Graf, which also deals with early hominins in Britain. It was written to summarise current thinking regarding early man in Britain, and was prompted by recent editorials*

Editor

## Early Hominins in Britain

Our recent and forthcoming talks programme shows continuing interest in the earliest human inhabitants of Britain, so the Editor thought a lightning overview might be welcome of the various human species visiting Britain at different periods. An excellent more detailed account can be found in 'Homo Britannicus' (pub.Allen Lane 2006, now in paperback) by one of our recent speakers, Professor Chris Stringer of the Natural History Museum.

It was *Homo erectus* that originally left Africa for Asia and southern Europe, soon after 2 million years ago. Probably they, or maybe a species of their descendants eventually made it north to Pakefield, Suffolk, the site of the earliest human occupation in Europe north of the Alps (*pace* the recent 'Charnia' account of the Chairman's AGM Report). Here flint cores, flakes and flake tools show them present, perhaps around 750,000 years ago, on what has been nicknamed the 'Costa del Cromer', basking in the same hot Mediterranean climate as they had left in Italy, Spain and Greece.

By about 50 thousand years later, our climate had cooled considerably for the next settlers here, at Happisburgh, Norfolk, further north along the same coastline as Pakefield. In addition to flake tools, they used the earliest handaxes in Britain, and must have been technically more accomplished, to cope with the cold winters we are now used to. They certainly required clothing and shelters, unlike their predecessors at Pakefield.

The first actual fossil remains of humans in Britain were not found until those from a site dated around 500,000 years ago. Boxgrove quarry, Sussex, produced a shinbone and 2 teeth from different individuals of the species *H. heidelbergensis*, a strong well-built 6-footer. He/she led a very vigorous and active life as a hunter of such large wild beasts as horses and woolly

rhinoceros, at close quarters, armed only with a stabbing spear such as that found at the later site of Clacton, Essex, and using handaxes to butcher the carcass.



It was from *H. heidelbergensis* that Neanderthal man (*H. neanderthalensis*) began evolving in Europe. The base of the skull at Swanscombe quarry, Kent, around 400,000 years ago, and the teeth at Pontnewydd Cave in North Wales about 225 thousand years ago both have Neanderthal traits. Their tools were made using a very much more complex technology, the 'Levallois' technique. Neanderthals' favourite prey, as at Lynford quarry in Norfolk around 60,000 years ago, was the woolly mammoth, ranging in vast herds across the rich grassland steppes of Britain, then a peninsula on the northwest tip of Eurasia. Neanderthals made tools out of local quartzite at Creswell Crags, on the Notts/Derbys. border, around this same time, and it was probably Neanderthals who paused awhile at Glaston, Rutland about 30,000 years ago to re-arm a hunting spear with a new flint blade point.

However, very soon afterwards this successful 'home-bred' European was extinct, replaced by another immigrant from Africa, anatomically-modern man, *H.sapiens*. This new species had evolved there from *H. erectus* or their descendants by around 150,000 years ago, and eventually reached Britain about 35-30,000 years ago.

Did the two species ever meet? We do not know... but DNA evidence shows that Neanderthals are not ancestors of the modern human population. Why did they die out? Again, we just do not know, though climate change is one of many theories: see Chris Stringer's book for more details.

Anne Graf

**November 19<sup>th</sup>**

**The Abberley and Malvern Hills European Geopark. Promoting Earth Heritage, Culture and Sustainable Regional Economic Development**

**Dr Cheryl Jones**  
**Department of Applied Sciences, Geography & Archaeology**  
**University of Worcester**

Established in 2000, the European Geoparks Network (EGN) aims to protect geodiversity, to promote geological heritage to the general public as well as to support sustainable economic development primarily through the development of geological tourism. The network has drawn together 33 territories from across Europe that share these aims and which are now working together in an active and dynamic way to achieve them.

The Abberley and Malvern Hills Geopark was awarded European Geopark status in 2003. The Geopark represents one of the classical areas of British geology. The Abberley and Malvern Hills form the backbone of the Geopark illustrating over 500 million years of Earth history. Stratigraphy from Precambrian to Jurassic and Quaternary is represented with almost complete successions of the Silurian and Triassic periods present. A fine range of igneous, metamorphic and sedimentary rocks exists with some nationally important exposures and exposures.

The Geopark has been working closely with the active and well established Earth Heritage groups located within the Geopark to create an environmentally sensitive programme of geological investigation and conservation. This is complemented by a public and educational awareness programme which is aimed towards fostering a greater appreciation and understanding of Earth heritage and the links between geology and the natural landscape. Examples of these initiatives include rock and fossil roadshows, public lectures, guided walks and self guided trails.

**December 3<sup>rd</sup>**

**The use of Synchrotron radiation to examine micropalaeontological specimens**

**Dr Giles Miller, Natural History Museum, London**

Synchrotron radiation is increasingly being used in the non-invasive analysis of internal structures of palaeontological specimens. So far these studies have mainly been on vertebrates (skulls, jaws, teeth) and fossilised embryos. The synchrotron beam ID19 at Grenoble, France, produces a particularly focused and fine beam of x-rays that is suitable for the analysis of the internal structure of micropalaeontological specimens. In Feb 2008 some specimens from the micropalaeontological collections at the Natural History Museum, London were taken to be analysed in this beam at Grenoble. Several Terabytes of image data are currently being analysed to produce 3 dimensional representations of these specimens. This talk is aimed mainly as an introduction to the study of micropalaeontological specimens using synchrotron radiation. Preliminary results from the Grenoble analyses will be presented and their relevance to microfossil evolution discussed.

**Field Trip Reports**

**Saturday May 17<sup>th</sup>**  
**Devonshire Mineral Collection at Chatsworth House, Derbyshire.**  
**Host: Mick Cooper**

The first outing of the 2008 Summer Programme took place on Saturday 17<sup>th</sup> May. Eighteen members assembled at the Security Lodge below the imposing façade of Chatsworth House. The weather was in the main fine if overcast.

Mick Cooper joined us and we were duly signed in and entered through heavy gilded wrought iron gates. Mick led us through a small courtyard and into the flagged corridors of the lower regions of the vast building. Without his guidance it would have been an easy matter to get lost. We passed bizarre artifacts including numerous wardrobes and enormous picture frames, some of which appeared to be made of sandstone. All around were the sounds of busy staff before we were led into the contrasting quiet of a fine carpeted library/work room. Mick commenced his talk with an outline of what he had been given both in terms of specimens and work space, a vaulted brick storeroom. Specimens were retrieved randomly from a confused mass of material, often wrapped in newspaper, or set on wooden mounts or even crumbling to pieces. More poorly labelled and curated specimens arrived as new areas of the house were cleared. Staff soon learnt where to send these items and slowly Mick and colleagues, spurred on by the rarity and fine quality of the minerals, commenced their forensic geology in attempts to find

their provenance. Despite the convoluted methods required, it was clear that Mick thoroughly enjoyed the quest, which took him abroad at times.



**In the curator's lair at Chatsworth, listening to Mick Cooper**

Mick and his helpers, including Section member Frank Ince, by unlocking the codes behind the faded and torn labels on the specimens realized that, in the main, they had come from three collections. As word got around Mick obtained a catalogue of an important 19<sup>th</sup> century auction where he discovered many of his treasures. Painstaking work confirmed the origin, means of transit and type of mineral. It seemed that the collection was probably started by Georgiana Cavendish, nee Spencer, Duchess of Devonshire. It would appear that Georgiana had the means to acquire specimens of great rarity and value but that she also sought to extend her knowledge of mineralogy by consulting, within her social circle, with scientists of the day. However when it became apparent that she was to give birth to a child that was not the Duke's she was ostracized to Europe and the collecting and cataloguing went into obeisance.

The baton was taken up by a later Duke, a bachelor who once again had the time and the means to seek out, in an age of avid collectors, the most prized specimens. Although less scientific in his approach the Collection continued to grow. And as the modern cataloguing progressed Mick was able to

acquire, on behalf of the estate, some ex-display drawers from a museum and further enhance the collection we see today.

We had the opportunity to go in small groups to another repository to examine some fine specimens held there, a small room shared with tapestries and other treasures. It seemed that despite the huge size of Chatsworth, storage space was at a premium and doubling up of quite unrelated collections was quite usual.

On leaving we gave a well deserved vote of thanks to Mick (and Frank, who was also present) and made plans to visit the Devonshire Arms in nearby Baslow. Mick indicated he might join us, but in the event did not. Notwithstanding, the small group that did assemble there enjoyed a lively, convivial lunch.

Helen Jones & Andrew Swift



### ***Corollary***

It was with great shock and sadness that all who attended this excursion, and indeed the Section as a whole, greeted the news of Mick Cooper's untimely death, only two weeks or so after the trip. We also remembered the fine talk he gave us in last year's programme. Condolences were sent to his partner and we were left to reflect how fortunate we were to enjoy his expertise at such an unknowingly late stage in his life.

Andrew Swift

**Friday June 20<sup>th</sup> – Sunday June 22<sup>nd</sup>  
Weekend excursion to the Cotswolds  
Director: Andrew Swift**

For many years a repeated (and thoroughly justified) request from certain factions of the membership has been to hold the weekend excursion in The Cotswolds, and finally in June 2008, it came to pass. Being only too aware of



the relative lack of Cotswolds geological expertise in my own case, and perhaps the Section as a whole, I made strenuous efforts to identify and secure a leader from the ranks of the knowledgeable, but without success. So if you can't find anyone else ..... First job was to locate suitable localities, mug them up and then do preliminary field assessments. Fortunately those tasks are not too difficult, as the Cotswolds have many wonderful exposures of Mesozoic sequences, especially of Jurassic age, all well documented. The Chairman and I undertook a reconnaissance trip in April and found that the chosen sites were both geologically interesting and accessible, so it was all systems go. I particularly wanted to uphold the (sometime) tradition of having the excursion over the midsummer solstice, and fortunately this year the 21<sup>st</sup> of June fell on a Saturday, so that weekend was designated for the trip. Winchcombe was chosen as a base and the party was invited to book accommodation in or around that attractive small market town. The one variable is always the weather, and sadly, apart from later on the Sunday morning, the skies were mostly steely grey and threatening rain, accompanied by decidedly unsummer'y temperatures, but we were very lucky and avoided getting soaked.

Continuing the trend of recent years and in view of the fact that most of us are able to get away on the Friday morning, the excursion commenced with a couple of visits from 1.00 on Friday. The first of these was to the working Oathill Quarry near Temple Guiting, which exploits mostly 'Yellow Guiting Stone', aka the classic 'Cotswold Stone' of the picture postcards, for building purposes. That was very much a last minute visit, as I'd decided against trying to include that locality, but the owners rang on the Thursday and were very keen that we should make the visit, so it was somehow fitted in over lunchtime. Because the notice was so short, only a handful of members were able to attend, but that detracted not at all from the fine geology, highlighted by the presence of a rare mudmound in the 'White Guiting Stone'. From Oathill we drove the short distance along the B4077 to Guiting Quarry, where the majority of the rest of the party joined the trip. Guiting Quarry is another working (but much larger) quarry extracting the Middle Jurassic Guiting Stone (Jackdaw Quarry Oolite and Devil's Chimney Oolite of the Lower Inferior Oolite Group). Younger units were exposed at the top of the quarry and these proved to be good levels for fossils. We were also allowed by the very obliging manager Phil Wood to see the stone cutting and dressing facility.

The full party of 19 convened in the evening in Winchcombe, where we met in the Plaisterers Arms. Many of us ate there before taking off for an inspection of the delights of a typical stone-built Cotswolds town. Saturday

dawned with cool temperatures and grey skies but enthusiasm was not dimmed by such trifling drawbacks. First stop was the landfill site at Bishops Cleeve (llamas or alpacas?), a large concern where Lower Lias clay was dug out, rubbish piled into the resulting hole and the clay put back as a seal. Some quite dangerous materials, like fly ash, were disposed of in that way, but we preferred not to dwell on that aspect. What was important to us was that the excavations exposed vast amounts of very fossiliferous clay, and little more was required of the leader than to briefly explain the stratigraphy and then turn the party loose. From Bishops Cleeve we made the somewhat tortuous traverse of Cheltenham on a busy Saturday in order to access Leckhampton Hill. This marvellous open access highland is a natural history paradise, and not least of its attractions is the geology trail laid out by the Gloucestershire Geoconservation Trust around the hill, with stops at the most interesting geological features. The trail is somewhat testing in places and quite long, but there were no complaints and the excellent geology, views, hill fort, tumuli, bee orchids, other wild flowers, birds and roman (edible) snails were more than adequate compensation.

Saturday's programme ended with a visit to Hornsleasow (Snowhill) Quarry, literally in the middle of nowhere, but a geologically famous spot nonetheless. The sequence exposes younger rocks than we saw at our other localities, these being of Bathonian age (Fuller's Earth and Great Oolite groups). These days Hornsleasow is abandoned and peaceful, and nature has made a comfortable home amongst the old excavations, but not so long ago a clay horizon yielded a startling array of vertebrate material, including dinosaur remains. And plenty of fossils were left for us, as demonstrated by the party's close attention to the faces, but sadly no vertebrates turned up.

Saturday concluded with the customary Section meal, taken in the evening at the White Lion in Winchcombe, and a convivial time was had by all. Just one locality remained to be visited on the Sunday, Hock Cliff on the Severn estuary near the village of Freherne. This is a long low cliff that exposes a Lower Lias sequence, of the usual shales and subordinate limestones type, and is another locality famous for its fossils. The traverse along it forms a most enjoyable promenade in scenic surroundings with the cliffs on one side and the Severn lapping at the shore on the other. On arrival the tide was at its maximum and wind was whipping the waves up into a slightly intimidating configuration, but the timing was perfect for a steady lowering of the waters as we walked. We ended our walk where the cliff disappeared and took a route back along the top through woods and verdant meadows. It had been a poor year for butterflies but one Clouded Yellow was spotted and several dragonflies.

The party broke up on the return to Freherne with the usual expressions of regret, but a splinter group found its way to the Bell at Frampton on Severn where the excursion concluded in appropriate style as we watched a cricket match on the village green in midsummer from the garden of an English country pub.

Andrew Swift

**n.b.** Photos from the weekend will be included in the next issue of 'Charnia'

**Sunday July 13<sup>th</sup>**  
**The Castleton Area,**  
**Leader: Professor Gerry Slavin**

On a perfect day ten members met Professor Gerry Slavin in the long term car park at the Speedwell Mines. He introduced himself by saying that he was, formerly, a pathologist and was and is a keen amateur geologist. We set off towards the Speedwell Cavern entrance and turned off just before Winnats Pass. Gerry explained that we were now at the junction of the fore reef and basinal deposits. We found pebble like fossil brachiopods and the area had in the past been considered as a beach, however the sequence of grading suggests turbidites, the material being washed from the shelf in catastrophic events. We then walked below Long Cliff and observed old workings and the washouts from 'wush' mining techniques. Evidence of volcanism was found in the basalt with its weathered 'rind' thought to be an intrusive feature.

We walked on to the Peak Cavern (aka the Devil's Xxxx), some 10m high and 30m wide. The three large chambers, the Vestibule, the Great Cave and Roger Rain's House, were all formed by solution along the bedding planes in lenticular backreef shoals, which eventually led to joint block collapse.

It was then time to examine Russett Well (by kind permission of Mr Peter Harrison) in which the drainage of the Peak Cavern emerges at depth and flows away into the village of Castleton. This prompted a discussion about percolating water and allochthonous water and the dye experiments which had mapped out the course of various bodies of water.

Next came Cave Dale, which is entered through a gorge which cuts through the fore reef, into the muddy micritic 'reef' and thence through to the bedded Bee Low Limestones, which are internal to the reef. As we walked up the reef, drainage became an issue once again with water appearing and disappearing as it percolated through the joints into Roger Rain's House and onto the paying customers! Beyond the reef volcanism is again in evidence

with columnar joining of basalt extending some 150m along the Dale. Further along the Dale widens and cuts through thick well bedded limestone.



**The Castleton group: Liz Bellamy, John Ingall, Ron Johnson, Gerry Slavin, John Hudson, Dennis Gamble, Helen Jones, Graham Cheesman, Dorothy Sowerby, Albert Benghiat, Joe Sowerby (photo: Joe Sowerby)**

We enjoyed our lunch looking towards Hurdlow. The top of Hurdlow is marked by spoil as cavers improve the access to Titan cave. Unfortunately the cavers were absent but Ron Johnson was able to explain how cavers overcome restricted access to explore cave systems.

After lunch we visited Dirlow Pit/Rake, which has been infilled, but it was still possible to observe the avenas from the rim. These are possibly formed by the rush of underground streams sending water spiralling upwards and exploiting lines of weakness to create cone shaped voids with ridged sides. We then walked back towards Castleton, stopping en route to rummage over spoil heaps for mineral specimens, which included flowstones, barite, fluorite, calcite, galena and limestones containing bitumen (oil crisis, what oil crisis!). Finally we walked past the workings of Hope Quarry and enjoyed fine views of the basinal Edale Shales.

A good day was had by all, although, at times, Gerry's definitions of ascent and descent were questioned! Field Secretary Helen Jones proposed the vote of thanks and the meeting ended at 4pm.

Helen Jones

### David Attenborough visits Charnwood to film Precambrian rocks and fossils

On June 26<sup>th</sup> the legendary broadcaster and media personality David Attenborough and the BBC Natural History Unit arrived in Leicestershire to film at Beacon Hill and The Outwoods for a programme to be broadcast on January 12<sup>th</sup> 2009, which will celebrate the bicentenary of Charles Darwin's birth.



Helen Boynton, Mark Evans, David Attenborough and Sue Cooke

I went into the field with Sue Cooke from the Charnwood Museum, who had done much of the organising. Mark Evans of the New Walk Museum arranged a visit to that Museum in the evening. I was privileged to talk to David over lunch and again in the Museum later. He was very interested in the fossils which we are researching and conserving, and asked especially about the affinities of the cyclomedusoid discs in The Outwoods, and the relationship between *Charnia masoni* and modern sea pens. He had not heard of recent work by Martin Brasier at Oxford who believes that the two grew in different ways and were probably not related.

We shall, I'm sure, look forward with interest to seeing the programme next year.

Helen Boynton

### Charnia's 50<sup>th</sup> Birthday – again!

The famous late Precambrian fossils *Charnia masoni* and *Charniaciscus concentricus* were formally named and described in 1958, and a wealth of literature has appeared in the last year or so. Members who like to keep abreast of the subject may find it useful to consult the following:

Vickers-Rich, P & Komarower, P (eds). 2007. The rise and fall of the Ediacaran biota. *Geological Society Special Publication* no. **286**, 456pp. List price £95 (members of the Geol. Soc. pay £47 – 50). n.b. Amazon.co.uk price is £62.70 (ed.)

This is a collection of 38 papers presented at symposia at Prato, near Florence, in 2004 and at Kyoto in 2006. They record recent studies of the many impression fossils in Ediacaran rocks (~ 635 – 543 my), some in areas where they have not previously been recorded, e.g. Argentina and Iran. However, the themes of their evolutionary origin and their extinction as implied by the title are not really covered and remain speculative. A paper on *Kimberella* concludes that it was a grazing or predatory mollusk, demonstrating that the biota was not entirely sessile.

Gehling, J. G. & Narbonne, G. 2007. Spindle-shaped Ediacara fossils from the Mistaken Point assemblage, Avalon Zone, Newfoundland. *Canadian Journal of Earth Sciences*, **44** no. 3, 367-387.

The abundant but enigmatic organisms found but neither named nor described in detail 40 years ago by Misra and Anderson are here named *Fractofusus misrai* and *F. andersoni*. They appear to be endemic to Newfoundland and the only other example is a poorly preserved specimen in Charnwood Forest. As no head, tail or holdfast is preserved, the nature of the organism remains unknown.

Hofmann, H. J., O'Brien, S. J. & King, A. F. 2008. Ediacaran biota on Bonavista Peninsula, Newfoundland. *Journal of Paleontology*, **82**, no. 1, 1-36.

The fossils from some 36 new localities in an area 300 – 400 km north west of the classic Mistaken Point are recorded here. They are spread through over 1000 m of strata with some apparently being of similar age to the Ives Head

strata in Charnwood Forest. *Ivesheadia* and *Blackbrookia* are recorded, though the illustrations of the latter are far from convincing.

Laflamme, M. & Narbonne, G. 2008. Ediacaran fronds. *Palaeogeography, Palaeoclimatology & Palaeoecology*, **258**, 162-179.

Using hundreds of specimens from around the world, eight shape morphologies are noted but the fossils are categorized in four genera: *Arborea*, with little evidence of secondary branches; *Charnia*, with secondary modular elements; *Rangia*, with tertiary branching, and *Swartpuntia*, with closely parallel tubular branches.

McCall, G. J. H. 2006. The Vendian (Ediacaran) in the geological record: enigmas in geology's prelude to the Cambrian explosion. *Earth Science Reviews*, **77**, 1-229.

Joe McCall has here provided a comprehensive review of the literature up to about 2004, with many illustrations taken from widespread journals.

Fedonkin, M. A., Gehling, J. G., Grey, K., Narbonne, G. & Vickers-Rich, P. 2008. *The rise of animals: evolution and diversification of the animal kingdom*. John Hopkins University Press, Baltimore, 336pp. ISBN 13-078-0-8018-8679-9. List price £50 (plus delivery; or £27 – 99 'as new' from AlbooksUSA, via Amazon).

A lavishly illustrated book (many in colour) summarizing pretty well all that needs to be known about the Ediacaran biota, with coverage of the relevant Precambrian environments, the effects of 'Snowball Earth', changes of salinity and carbon 13 isotope excursions. Notes on stromatolites and microbes, and some personal backgrounds to the discoverers and researchers are included. There is an illustrated alphabetical index to the hundred or so Ediacaran fossils now known and a comprehensive bibliography. It is probably the 'best buy' on the subject available.

Trevor Ford

## The Ring Quarry

It seems that last year's celebration of the 50<sup>th</sup> anniversary of the discovery of the Precambrian fossils in Charnwood Forest may have been a shade premature. Frank Ince and Mike Howe have called our attention to a short paper by R. A. Eskrigge, 'Geological notes made during a tour of Leicestershire', published in the Transactions of the Manchester Geological

Society for 1868, vol. 5, pp 51-57. Eskrigge's ideas of the geology of Charnwood Forest are confused to say the least, as he did not really understand the relationship of the intrusive 'syenites' to the slaty rocks and suggested ages of Cambrian, Cambro-Silurian, Laurentian or pre-Cambrian (the whole concept of pre-Cambrian rocks was in its infancy then). It is the discussion following the paper which is important. Amongst the contributors to that was Mr Plant, 'who had recently moved to Manchester'.

It is Mr Plant's contribution on page 56 that is very significant. He realized that the rocks were pre-Cambrian and continued:

*'The only traces of organic remains which have been found in the slaty rocks are the remarkable rings seen at Woodhouse Eaves, discovered by myself and the late James Harley in April 1848. They occur with two raised rings, commencing with a sort of central boss, going round, and varying in diameter from six inches to one foot. Professor Ramsay's opinion is that they were very likely spots where large seaweeds had been rooted, and probably by the action of the seaweed bending round by the force of the water, scooping out the mud in concentric circles'*

This quotation tells us that the rings we now know as the marks made by the holdfasts of frondose organisms such as *Charnia* or by medusae (jellyfish) were known as early as 1848 and that Mr Plant recognized that they were traces of Precambrian life. His friend, James Harley, was a prominent local naturalist. Professor Ramsay's opinion was probably expressed soon after the discovery. Ten years later Ramsay included a comment in a three-page section on Charnwood rocks in a 'Descriptive catalogue of the rock specimens in the Museum of Practical Geology' (of the Geological Survey) (1858). Ramsay later became Director of the Geological Survey.

The quarry near Woodhouse Eaves was then locally known as the Ring Quarry, and it is thought that it had only just ceased working in 1848. The name Ring Quarry seems to have been an informal one bestowed by local people, though it was noted in a later report by James Plant to the Leicester Literary & Philosophical Society. It was also known as Pocketgate Quarry from the nearby farm. Today we know it as the North Quarry, situated on the edge of the Charnwood Golf Course. If quarrying had continued all trace of the fossils we know today could have been destroyed.

Subsequently Professors T. G. Bonney of Cambridge University and W. W. Watts of Imperial College dismissed the rings as concretions and they were forgotten. Without these expert opinions we might have known about Precambrian fossils very much earlier than their discovery by Roger Mason



and his friends a century later, in 1957. As we now know they had been seen by Tina Negus a year earlier, but her observations were dismissed.

If Mr Plant and his friend James Harley saw the rings it raises the question of how they missed the impressions of *Charnia* and *Charniodiscus* but perhaps these were covered by quarry waste or vegetation. Nothing is known of R. A. Eskridge but there were two J. Plants, both associated with Leicester Museum, John and James. John was an honorary curator when the Museum was operated by the Leicester Literary & Philosophical Society before being taken over by the Town Council, he moved to the Manchester area in 1849 so it is probable that he is the one who made the remarks in the 1868 discussion. James Plant remained in Leicester as an honorary advisor to the geological curators until the 1870s.

In the early 19<sup>th</sup> century the Ring Quarry was on the Beaumanor Estate and probably provided building stone, so perhaps the counterparts to the fossils are hidden in an unknown wall or building.

Trevor Ford

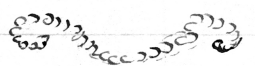
**[April 1848. Letter from James Harley to Prof William MacGillivray, Aberdeen University, transcribed June 2008 by Mark Evans]**

On our way to Leicester Abbey from the Outwoods side of Charnwood Forest we turned aside from the direct road that leads through Woodhouse for the purpose of making a minute examination of the slate rocks which mark so characteristically that remarkable sylvan part of the County. Our short visit was most happily chosen since we found the actual slate of the locality in question invested with certain appearances of deep interest to ourselves and also to other observers of the like phenomena. It has been admitted, and supported, you know by certain geologists, but with what kind of success I am not prepared to say, that the hypogene or clay slate rocks contain no organic remains, whatever; although of late it has been discovered beyond all contradiction that certain forms have been met with in the Llandiloes flag indicative of certain facts moreover which appear opposed to such conclusions.

However, we ourselves are not prepared to demur to such matters; neither are we careful to advance an opinion or hazard an hypothesis. These crude subjects we leave for others to determine, whose hours of conjecture and speculation may fortunately meet with more willing votaries.

On the very surface of a large portion of these slate rocks to which we have referred, and which we were careful to examine, we observed many circular

and spheroid forms at first glance reminding us of certain well known impressions of Ammonites. Several of these figurations we measured, many of which were ascertained by us to exceed five and six inches in diameter. We also observed certain other forms – one especially bore some resemblance, we considered, to an Annelid, or rather a vermiform impression. (*continues* .....

*pression. One figuration appeared to the eye in such a style as the following;  while others resembled at first sight the peculiar scal like impressions of some species of ammonites. But the whole series of figures*

(*continued* ..... we observed were irregularly displayed to our view over the entire surface of the rock, the phenomenon having been brought fairly to the eye by the recent operations carried on a number of workmen engaged in the business of mining and preparing slates for the purposes and use of man.

If the peculiar, and remarkable figurations to be seen on these slate rocks forms should prove on closer examination to be organic remains, as I conjecture they may; our small discovery in such a fruitful field of ingenious inquiry, and research, may result in the very fact of certain hypothesis heretofore held as tenable by some writers of modern date, and note, being partly, if not wholly, ignored.

I must not omit all notice of the iron pyrites which occur in the form of cubes in these said hypogene rocks. Such metallic deposits are by no means of uncommon occurrence in the rocks of the district which I have so imperfectly described to you in my present letter. At a distance of four or five miles from Woodhouse in a westerly direction where the clay slate appears to repose on the primitive, volcanic rocks similar proofs of the presence of pyrites and cubes of iron occur.

*n.b. Mark Evans and collaborators from the BGS are preparing a paper on the history of the discovery of Precambrian fossils in Charnwood.*

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