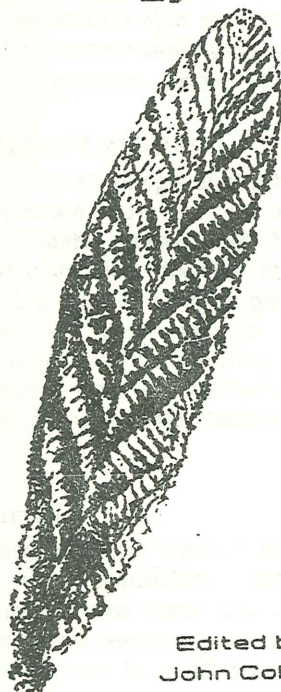


Newsletter of the
Leicester

Literary and Philosophical Society
Section C

Geology

**Late Autumn
1991**



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Charnia

Nothing Ventured . . .

It appears that sales techniques sometimes work. The new venture which we introduced in the first Charnia heralded a lot of effort on the part of the committee in looking at how best to encourage membership. To date we have seen a very healthy increase in the number of people attending the indoor meetings. The range of content has not changed, so it must be assumed that we're just telling more people about us to greater effect.

One swallow doesn't make a summer, however, and we shall be looking for this improvement to be continued before we can claim success. This includes attendance at field meetings next year, where attendances have been the same. Geology is not an armchair science, and we should dearly love to see more people in the field. To this end we are publicising a wide range of activities in the Diary - but if you want something that isn't there, then please tell us. The said Diary has news of fourteen lectures, seven day trips, two residential trips, three conferences, one exhibition and three day schools offered by six societies and organisations. There must be something here to interest everyone.

In this issue:

Accounts of field trips:
Bardon Hill, Leicestershire
Little Paxton, Cambridgeshire
Charnwood, Leicestershire
Cambrian Warwickshire
Jurassic Peterborough
and
Carboniferous Somerset

Dr Trevor Ford on discovering
Charnia masoni



Lit & Phil's
comments on
the injury to
the Rutland
Dinosaur



Editorial - John Colby

It comes as something of a shock when the news reports the Oxford Street Christmas lights being switched on, fireworks lighting up the sky, scraping the car clear of ice in the morning before you can drive off, and son's school preparing the carols. Just where has the year gone?

One place where it's gone is in writing about geology, in other words this and other newsletters. You might notice that its larger than previously. You might notice that we have tried to include pictures - how successful this part of the experiment is will be judged when we get it back from the printers. You might notice that only a very few people have contributed to the writing or production of this issue - Thank you Trevor, Helma, Graham and Sandy, and to Alan for providing much of the material for us to write about. Therefore, unless you wish to read the same few people again, please put pen to paper (or voice to tape recorder - we have the technology) for the next issue which will be produced over the Christmas period. Any topic, be it ever so slightly geological, is welcome. I am always ready to receive articles, items of news and the like.

Diary

It was decided at one of our committee meetings that other Societies events be placed in our diary. This is being reciprocated with the other Societies. If you know of any other events the membership at large would welcome information upon, please let me know.

The diary also contains information of residential trips organised by the Dog House when wearing our other hat, that of Branch Organiser, or, as Trevor Ford put it, Führer, of the Open University Geological Society. In that organisation we welcome non-members on all trips - if you can stand us, that is. So

don't be put off because you aren't a geological academic - we're not - just a bunch of (mostly) amateurs interested in geology in the broadest sense. If enough people of the Lit & Phil become interested in field trips, something that has been a little lacking this summer, then adventures further afield can be organised under our own auspices.

Big Reptiles

Leicestershire is big reptile country - both in finds and learning. It is encouraging that the Dawn of the Dinosaurs exhibition, which originated in Plymouth coinciding with the BAAS meeting is going on tour, and that the only stop on that tour is Leicester. Co-incident with this is the Vaughan College Saturday School on the same subject. The Taylor-Cruikshank conspiracy is at work again.

Apt Names

Mac Whitaker collects names of people who relate to their professions - for instance Jenny Potts who wrote on the caves of the Dove and Manifold Valleys (pott-holes?) in Limestones and Caves of the Peak District (Ford). In similar vein I've just changed my full time job - the location of which is Pebble Close, near Feldspar Drive, Mica Close, Amber Close, Sandy Way all off Penine Way, Tamworth. Incidentally, Mac, have you thought of Roger Mason, and his work with stone?

The Year So Far

The first three talks of the winter season have been very well attended partly as a result of the extra publicity being placed in points of interest by members of the committee. I jest not, the Society was in very real danger of becoming extinct had the attendances not been greater. I can only appeal to members to make the effort and come out for the evening. We've now started

having coffee from 7.00 pm, there's a different display every meeting of something of geological interest, members have started bringing specimens and we have a generally more social atmosphere. Many thanks for the hard work the committee is putting in for all this. In addition, post meeting there is a gathering to chew the geological fat in the bar of the Belmont Hotel after most meetings. Anyone coming along is welcome to join in.

RIGS

RIGS is progressing with the group identifying sites of interest and contacting interested parties. When appropriate we shall be able to give an update.

December 4th

May we draw your attention to the venue and content of the meeting on December 4th. This is at the Museum, not the University, and the content is as you make it. We are looking for contributions of food, drink (not all alcoholic) specimens, slides etc. This evening is what you make it.

Fossils of the Oxford Clay

This is a Palaeontological Association book, edited by David Martill and John Hudson. It details and describes its subject, and is invaluable for discovering just what it is you've dug up. I'm not qualified to review it with a professional eye, but already items which have been in our findings unclassified now no longer hide in the cloak of anonymity. Superb value at £15.00

Tailpiece

Contributed by my son, Richard, age six.

Question:

Why did the dinosaur cross the Road?

Answer:

'Cos chickens weren't invented then.

Survey

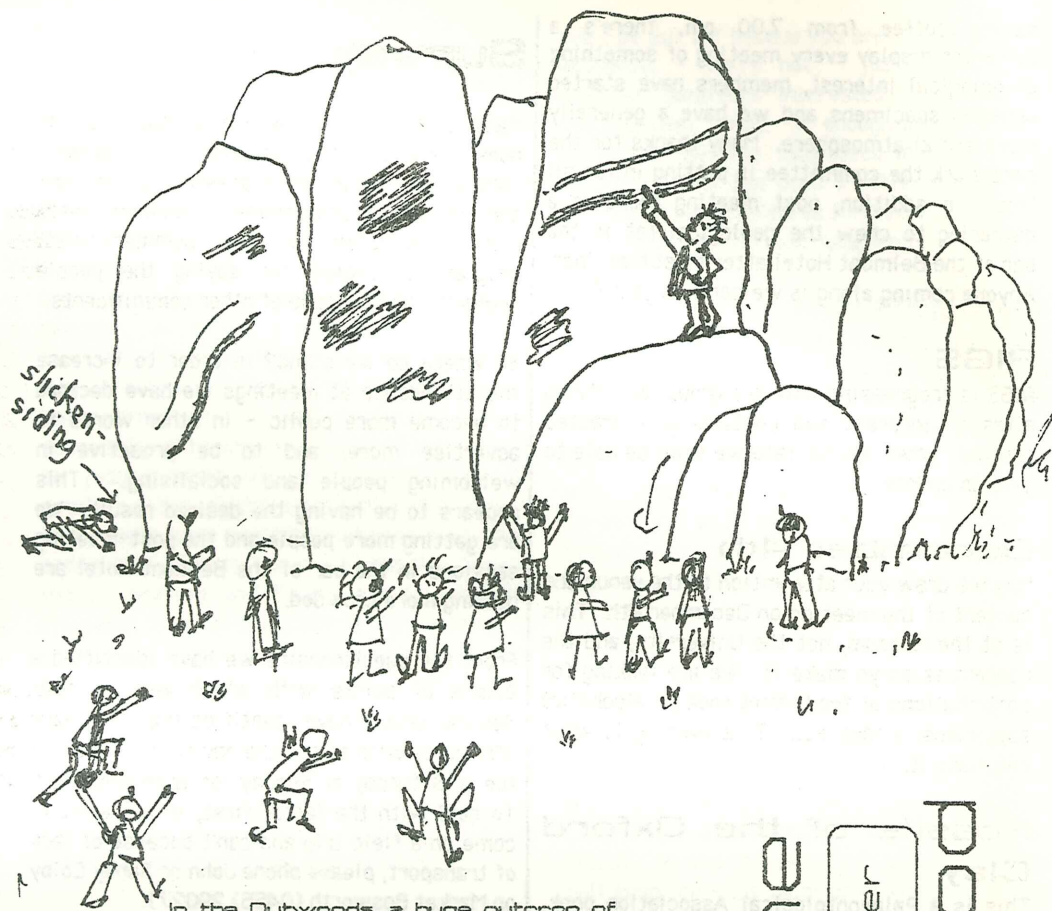
Many thanks to all who responded to the questionnaire in the last issue. The general conclusion is that we're presenting the right sort of winter programme. Comments were more restricted on the summer visit programme, except for saying the people couldn't come because of other commitments.

So where do we stand? In order to increase the attendance at meetings we have decided to become more public - in other words to advertise more, and to be proactive in welcoming people and socialising. This appears to be having the desired result. We are getting more people and the post-meeting sessions in the bar of the Belmont Hotel are getting more crowded.

From the questionnaire we have identified a couple of points with which we can help. Several people have identified that they have difficulty with either the day of the field trip (be it Saturday or Sunday) or with transport. To deal with the latter first, if you want to come on a field trip and can't because of lack of transport, please phone John or Sandy Colby on Market Bosworth (0455) 290271.

With regard to the day, the diary contains all activities of the Lit & Phil, the East Midlands Geological Society, the Stamford and District Geological Society and the East Midlands Branch of the Open University Geological Society. Any member of any Society is welcome on any trip. There may be a small charge levied. All societies will make any member of any other society welcome at their indoor meetings.

Please remember that it would be a good idea to telephone the relevant organiser of a trip before the event as there might have been some last minute changes.



In the Outwoods, a huge outcrop of Maplewell Group slump breccia showing cleavage. John is pointing to a bit of slump: a layer of incoherent sediment that has slipped or rolled down the slope it formed on [earthquake?]. This shows beds of fine grain (periods of volcanic calm) and thinner beds of rougher texture when more violent eruptions caused coarser ash and pyroclasts to reach this distance. Also present are lumps of older rock caused to fall into this sediment. All this was on the edge of the whole formation. A few feet distant was a near vertical cliff, and below we could see the fields and Loughborough on the much younger Triassic plain

Springtime in Charnwood

by Helma Tasker

Wasn't it a lovely morning when we met in the car park and so many people turned up, from all over the country it seemed. A blue sky and a light breeze, fresh leaves opening on the trees, the bluebells just showing their colour, chaffinches, wagtails and squirrels everywhere: a really peaceful Sunday morning. Little did we know what a tale of violence and catastrophe which was about to unfold.

Off we set up the road, discussing the Hangingstone Hills visible on the golf course, and Muriel fell flat on the road; this had relevance because it was the only flat surface around that day. The Hangingstone Hills are named for the angle at which they are sticking up in the air only partly supported. 700Ma or more ago this peaceful area was a shallow sea with volcanoes spitting and spewing continuous clouds of ash and dust, and now and then more violently, explosively, larger bombs from headsizes to housesizes. This settled into nice flat layers and beds in the water; it is said that these layers, now solidified into pyroclastic tuffs, are up to 4km thick. Can you imagine the rumbling and shaking during so much erupting, and the force of the explosions needed to hurl such large rocks over a distance of miles from where the centre of the volcanoes was thought to have been. And the over many millions of years they were uplifted, bent and sunken many times till now they are so distorted that every dip we measured during the walk was between 40° and 60°.

I wonder what the day-trippers thought to see us examining the walls of "the second oldest bog in Britain" fresh surfaces of Precambrian tuff and diorite topped by a roof of Swithland Slate. And Prince Charles opening stone for "The Men of the Trees" which John conveniently mentioned that it was a specimen he had prepared earlier(!), quarried locally and all nicely polished to show the attractive mottled green and pink colour, and the large crystals showing that it was a diorite, igneous, plutonic, cooled slowly at

depth, "labradorite, hornblende and interstitial quartz set in a matrix of granophyre". (I looked that up, 'Geology of the East Midlands'.) One of the sides showed slickensiding, another had mineralisation and a third had yellow xenoliths.

Buck Hill next; just through the woods, across the road, Jubilee walk and there it was; this was the longest uphill drag I ever hope... Poor Muriel, still suffering from the effects of her fall, was still behind me so how could I give up. But wasn't it worth it. There in beautiful sunshine were the most extensive and picturesque outcrops like stained glass windows in orange, greens, browns and pinks, criss-crossed with cleavage lines in brown stain. And VERY smooth and soapy to the touch, formed of very fine dusts.

No hope of a rest either of limbs or brain, we were at the dips again and forced to employ grey matter till we got the required answer: there, in the middle of the worn off top of the anticline was a dinkie little syncline, not 30m across, with dips as steep as all the others we had met that morning. A scramble down, along and up again and we found ourselves on top of Beacon Hill so named because it is still used for beacon fires: Queen's Jubilee, Armada 400, etc.. Nominally the second highest point in Leicestershire BUT since Bardon Hill is fast being quarried away stands a chance of soon becoming the highest, and a popular viewpoint for sunsets aeroplanes and "that's my house over there"

Here we were at a height of 248 metres above sea level, on rocks that are the Precambrian basement of England, and that in most other areas is 2000 ft below sea level. See the sections across Geo maps. Those stratigraphic levels they make us learn about are here worn off, gone, blown away in the wind.

Now it became apparent why we had taken all those measurements. We could see before us

Springtime in Charnwood

the range of outcrops we had traversed, all dipping to the NE. These were the NW/SE running hills forming one side of the anticline.

After lunch most of us met in Bradgate Park, in the area further SE which is the nose of the anticline, the axis of which dips in SE direction.

This was the ancestral home of Lady Jane Grey, and the peculiar shaped oak trees are said to have been beheaded at the time of her execution. The Park was eventually given to the citizens of Leicester by the family. It is a large area with grass-heath, bracken, hills and outcrops, beloved of families, birdwatchers, families and hikers alike.

From the Hunts Hill Car Park with the oldest rocks and The Oldest Bog (very useful after the trip to the pub) to the top of Old John. I never thought that to distinguish bedding planes from cleavage would be so difficult, but the banding due to turbidite flows, not seen earlier, did help here. What made the biggest impression was the bit of slickensiding in situ with layer-lattice mineral, as fresh as when it happened so long ago. The map shows a great fault traversing NNW-SSE and I think this must have contributed to the steepness of the slope.

Profile

Helma Tasker, a retired teacher, is a student with the Open University. After studying the Science foundation course last year, this year she undertook the core geology course, coded S236. The account of Charnwood in Springtime was her first mapping trip, which I led. On this trip, which happened on the hottest day in April, I made them climb up from the Outwoods to the top of Beacon Hill via Buck Hill, an ascent of a mere 120 metres. Unfortunately I had underestimated both the fitness of the party and the heat of the day, so we reached the top of Beacon Hill rather more exhausted than when we had left the Outwoods.

Despite suffering this alleged torture, Helma is still speaking to me, has come on more field trips and has joined the Lit & Phil.

On the SW side of this hill is a great exposure at 60° dip where the Precambrian trace fossils *Charniodiscus* were recognised. Did anyone find all the 60 reputed to be there? The interpretation of of flatworm type organisms becoming established here during a long volcanically calm period and then being buried suddenly by the next period of active volcanism makes a lot of sense.

Faulting at right angles to the lines of the spectacular Sliding Stone Slump Breccia Member is very visible despite the smooth covering of grass - the lines are interrupted to continue in the same direction but 100 ft or so to the North - twice.

We are now moving on to lower but younger ground (the drooping nose) and observed the different cleavage, like guipure lace, in the yellow and brown bedding planes of the next and younger outcrops.

We did appreciate the next highlight, it was just that those of us who were still surviving were subsiding to the ground at every opportunity. Charnwood is my back yard and I have birded and flowered here many times, even visited with a geologist. But this was very new to me: an area about 8ft x 10ft, a perfect model of a channel worn into the tuff by a waterflow containing conglomerate and coarse grained tuffaceous greywacke. There are water worn pebbles and some more angular fragments.

by John Colby

Red Rocks Green Rocks

The Date - Saturday 18th May 1991.

The Time - 9.00 am.

The Place - Bardon Hill Quarry.

The Weather - Overcast

The Plot - to get into the quarry and spend as much time there as possible

The Cast - Various Members of the Stamford Geological Society, the Open University Geological Society and the Leicester Lit & Phil. Unfortunately this last mentioned group was the smallest in number.

Bardon Hill is the highest point in Leicestershire at 278 metres (that's 912 ft for those who still think in old money) and is composed of andesite with areas of dacite overlain by Triassic marls, according to the geological map. It is also featured on the "Geological Walks in Charnwood" Leaflet of Leicestershire County Council.

The Geology of the East Midlands (Sylvester-Bradley and Ford, 1968) states that "a large mass of the Pedlar-type porphyroid is exposed. (This is previously defined as that found at Pedlar Tor, High Sharpley and Houghton Hill, containing phenocrysts of potash feldspar, plagioclase and quartz set in a microlithic matrix of epidote, chlorite, feldspar and iron ores.) [At Bardon]... it exhibits a chilled margin at its contacts

An account of the trip to Bardon Hill Quarry, where the skills of the assembled company were put to the test.

John Colby

indicating an intrusive origin. Going from north to south across the rocks exposed in the Bardon quarries Pedlar-type porphyroid gives way to a zone of mixed rock which is followed by a greenish crystalline rock known as Bardon 'good rock'. Slate agglomerate and tuffs lie to the south of the 'good rock'.

There has been much controversy about the nature and origin of the Bardon Hill Rocks. They have been regarded by some as dominantly pyroclastic and by others as mainly intrusive. Clearly this is one of the areas in Charnwood on which work remains to be done."

Bardon rocks were radiometrically dated at 684 +/-29Ma using K-Ar (Potassium/Argon). However, these are given as minima because of the loss of argon during periods of heating and/or stress. (Meneisy and Miller, 1963).

Back now to the field trip. Having visited the quarry manager, the group drove through the quarry and into the old part, where a certain amount of parking space was found. This was about eight acres in all, and soon people were examining the mineralisation of the quarry faces, the while observing the potential instability of the rough hewn faces above. Twenty or so tonnes of rock dropping from a height of fifty feet would make no little dent in the hard hat.

Mineralisation is extensive and varied. The R.J. King contribution in the aforementioned book suggests that there have been various periods during which mineralising fluids have



Bomb rocks in pyroclastic matrix
Bardon Hill Quarry

Red Rocks, Green Rocks

been at work in the Bardon rocks through a number of systems of faults and joints. King mentions the dominance of a strike faulted system which has subsequently been modified by subsequent activity.

The comments of the members of the field trip could only come up with such gems as "that's pretty" or "what do you think this is?" Samples were brought away for analysis, and identification has not proceeded much further than that on the day. With the rocks, we had more success. There were red rocks and there were green rocks. However a photograph taken on the day shows that we also found a brown rock.

A visit from the helpful quarry manager gave us permission to go in the deepest parts of the quarry to the north of the summit of Bardon Hill. On the journey we proceeded to add weight to the cars by driving them through loads of red sticky mud. Fortunately no-one got stuck. After an abortive visit to the deepest part of the quarry (abortive because we had seen most of the rocks

displayed elsewhere) we landed at the high point of the day - red AND green rocks extending in a band up the quarry face. Various boulders were examined and some specimens brought away for further analysis. Speculative looks were cast at the most spectacular lump of rock, photographed by most people and coveted by all, but at half a tonne or more it was just that little bit too big to fit into the boot. However, a smaller lump, excessive by most peoples standards was loaded into the boot and currently resides in the garden showing its best face to the world. Other fragments show banded red and green rocks, some sort of flow structure, possibly.

Discussions took place over the origin, and a vent-agglomerate theory emerged. However, expert opinion differs, and they may be bombs.

One o'clock signalled the end of the field trip, and chucking out time. A muddy ride back changed the car's colour from metallic blue to metallic mud. Thanks must go to Alan Dawn for organising the trip, and the quarry owners for permission to visit.

Access to Quarries

The problems of access to sites of geological interest is not new, but recent experience on a few field trips has shown this to be an increasing phenomenon. The Lit and Phil has had to miss a visit to one quarry and last month the Open University Geological Society was due to visit a quarry which had been visited many times before, but the quarry owners cannot agree terms of access with the mines inspectorate. Owners too are under pressure to comply with the strictures of the Health and Safety at Work Act (1974). The situation is not going to improve over the next few years, as increasing numbers of requests come for visits come from schools as part of the National Curriculum.

This has obvious implications on the type of visit which Alan Dawn is able to organise as part of the field programme. We can only hope that we can still obtain access to sites of interest.

In the Beginning . . .

The Story of Charnia told by Dr Trevor Ford

Your Newsletter takes its name from Leicestershire's most famous fossil, Charnia masoni. This was discovered by Roger Mason, then at Wyggeston Boys School, in 1957, whilst he was on an unofficial climbing trip to one of the old quarries on Woodhouse Eaves golf course. He came in to the Geology lab. of the infant University (there were only two staff in Geology then!) and I happened to be the mug he met. I was rather sceptical of his sketch of a frond-like fossil impression but he brought his father in to support him and as he was both a Minister of Religion and a member of the University staff I couldn't ignore him. So we all piled into the car and drove out to Woodhouse Eaves where I saw the famous fossil in all its glory on a sloping bedding plane of slate. With Roger's agreement (he subsequently read Geology at Cambridge and became a Lecturer at University College, London, though his interests were non-palaeontological) I "took over" the fossil for formal diagnosis and description.

Through the good offices of Leicester Museum's geologist we obtained the loan of two quarrymen from Mount Sorrel and they levered off a couple of tons of rock to free a block bearing the fossil impression. This block still weighed some 4cwt we had to borrow tackle and lift it onto a borrowed lorry to get it back to Leicester. Later it was taken to a stone mason in Leicester who brought this large circular rock saw on to the block a bit too sharply - bits of saw blade went everywhere and the block shattered. Fortunately one piece had all the fossil impression on it so the desired effect was attained more or less by accident. At around 60lbs this block is manageable and is on

display in the Geology Gallery of The Leicestershire Museum in New Walk.

Meanwhile the old quarry revealed several more impressions, some of disc-shaped organisms (or parts thereof) and a few more fronds, none as well preserved as the original.

I realised the importance of this fossil straight away as nothing like it had ever been reported anywhere, let alone in the late Precambrian rocks of Charnwood Forest. I consulted my former Palaeontology lecturer at Sheffield University, Mr Sylvester-Bradley (later to become Professor at Leicester). He was then editor of the Yorkshire Geological Society Proceedings, and he recommended that I write up a short description for them (Ford, 1958). Without any fossil of this frond-like nature for reference purposes I compared it with certain types of seaweed using both disc and frond and suggested a reconstruction as a single frond-plus-disk organism, though introducing separate biological names for each part. (parataxa in today's Systematics and the companion Charniodiscus concentricus was later redefined by Jenkins and Gehling (1978)). Later, in 1963, I described some larger disk-like impressions from the Outwoods, and a whole array of impressions has been found, mostly by Helen Boynton, in Bradgate Park.

Within a few months a note from Professor M. F. Glaessner in Adelaide, Australia appeared in NATURE (Glaessner, 1959). Unknown to me he had been working on the discovery of similar frond-like impressions in the late Precambrian rocks near Ediacara in the Flinders Ranges of South Australia. (And of course our discovery was not known to him

until my publication in the Proceedings of the Yorkshire Geological Society). Subsequently it turned out that they have vastly more exposures of these rocks and many hundreds of specimens. I was able to visit these at Adelaide and spent two days in the Flinders Ranges with Glaessner's associate, Mary Wade, in 1969. Glaessner and Wade wrote a lengthy paper on the Australian material in 1966 and Glaessner updated this in a book in 1984; his successors Richard Jenkins and Jim Gehling published some very sophisticated interpretations of the impressions in 1978.

In 1965 I took the opportunity of six months Study Leave from my lecturing post in the University to go to the United States to visit localities where some fossil traces had been recorded from Precambrian rocks. None turned out to be of Charnian type, but it led me into a visit to the slightly older (800 million years) late Precambrian rock outcrops of the eastern Grand Canyon, where a whole variety of single-celled algal fossils have turned up. The original discovery of 2mm diameter carbonaceous blobs had been made by Walcott in 1882-3 but he thought that they were small fossil brachiopods allied to the Cambrian Obolus and named them Chuarina, now regarded as large unicellular algae and it was through my work with Bill Breed, then at the Museum of Northern Arizona, that a wide range of micro and macro unicellular algal fossils in the late Precambrian of the Grand Canyon became known, but that is another story.

The consensus of opinion today is that the frond-like fossils of Charnwood are the impressions of primitive Coelenterate organisms closely related to modern sea-pens (Pennatulaceae), though none is well enough preserved to demonstrate the nature or even presence of polyps beyond doubt. At least some of the disks are thought to be the upper surface (umbrella) of jellyfish-like organisms. Spirogyra which may be impressions of some form of colonial coelenterate and a possible fragment of a

segmented animal Pseudovendia charnwoodensis. Boynton and Ford (1979) have also been found in Charnwood.

Other finds of similar fossils have been made over the years since our Charnwood discovery. Frond-like impressions have turned up in South Wales (disks only), North Carolina, Namibia, the USSR, China, Northern Australia, Alaska and in particular in Newfoundland. With some hundreds of specimens known at some 30 localities in the latter, it is a pity that no full description has ever been published. All the occurrences are in rocks of very late Precambrian age, mostly with problems of obtaining accurate isotopic dates, but somewhere around 600-700 Million Years. A stage name of Ediacaran has been applied to these rocks as part of the Geological Time scale.

It is often said that many scientific discoveries come about by accident; this is certainly true of the original find of Charnia; in turn it was this accident which led me to the Grand Canyon and to Chuarina. And indirectly these led me to Australia and to other delights. It goes to show how one must grab opportunities when they appear unexpectedly, even if they are based on material 600 million years old!

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Juddy's

being the colloquial name for Judkin's Quarry, Nuneaton.
Account by Sandy Colby

The morning began with the sun shining, the birds singing and, what for field trips is most unusual for us, a short journey. John and I set out with plenty of time to travel the 12 miles to the meet but as with all good intentions things did not turn out that way. As we approached a small village on our way to the first destination a small hairy dog was seen wandering down the white line in the middle of the road. Of course we had to stop, and half an hour later after calling at most of the houses in the village we had still not found its owner. We had also been told several times that plenty of dogs got dumped around there. As time was now at a premium we decided to get to the meet point and then take the hound (who by now had been called various names - Fido, Fred, Pooch, Tom, Dick, Harry etc. in an attempt to ascertain if it reacted) to the local Police Station.

Well that was the start of the trip. On return from the Police Station we thought we would have to go in search of the others (sixteen in total from East Midlands and Walton Hall). Wrong, they were still driving round in circles trying to find the entrance to Judkins Quarry! At last everyone was ready and we set out to discover what we could about the Nuneaton Inlier. The entrance to Juddy's (as it is known locally) was down a cutting where some time was spent in looking upwards (not unusual for geologists!) The rocks at the top of the cutting were Triassic - sandstones and marls with moderately good stratification. The base was probably Pre-cambrian, irregularly jointed and slightly blue in colour. We knew we were in the Blue Hole Quarry.

Some of the lowest of the Triassics were found to contain fragments of older rocks - the basal breccia. About half way up the

cutting were seen rubble of the Blue Hole Group with their distinctive jointing pattern. These are massive homogeneous rocks broken off by short term rapid floods in the desert conditions prevalent during the Triassic and deposited in wadis. The Triassic range in age from 260Ma to 213Ma. Many of the samples in this area were pyroclastics and the grain size ranged from coarse to very fine.

We now started to walk down into the quarry which makes a change from most field trips where its uphill first! Here we looked at large blocks of pyroclastics containing quartz and feldspar crystals. These were fragmental and poorly sorted, and would have been deposited rapidly in hot volcanic conditions. Mike Henty found a superb example of ripple bedding which had conveniently fallen down as scree (very large scree) from the Triassic. This was in the green marl beds (ferrous rather than ferric), and much discussion was now heard whether a structure on the east side of the quarry was a tiny infilled wadi. There were also signs of mineralisation in the calcite rich veins found at the base of a probable fault.

At the far end of the quarry, some 200 ft below the level of the main road running from Nuneaton to Hartshill, we looked at examples of Markfieldite. This is slightly darker than that found at Markfield, but does contain alkali feldspar. Markfieldite was first exposed in this quarry in 1937 and identified by Shotton and Wills. The top of the Precambrian shows an erosion surface and the basal beds of the Cambrian are brecciated, with the clasts being clearly the Markfieldite. This indicates an unconformity and hereabouts the radiometric dating of the Markfieldite gives an age of 603 ± 2 Ma. This

therefore puts an upper bound on the age of the Cambrian rocks.

On the south east side of the quarry we also found the contact between the Precambrian and overlying sedimentary rocks. There is a conglomerate at the base of the Cambrian, again an indication of the unconformity noted earlier. The age of this unconformity has been set to 603-590Ma. All of the Cambrian rocks were jointed and full of veins near boundaries (calcite, manganese, pyrite and galena).

Now came for what every field trip should have - a pub stop for lunch. Fortunately we had the weather in our favour and could sit outside as the noise of music(?) in the bar was so loud that you had to shout to order! Are we all getting old? An hour and a bit later, well fed and watered, we went to the second quarry of the day. After much map reading and discussion it was decided that it was called Boon's Quarry. We spent a happy two hours or so discovering or discussing (or both, depends on what you were looking at) what we thought was a sill.

Two agile(!!!?) members (one our own Editor) spent some time clinging to rocks in order to throw specimens to the rest of us more sane members who had stayed on terra firma. The rocks were pyroclastics of sorts, possibly Cambrian and contained quartzite, lumps of boulders and other conglomerate items. The graffiti on the side of the rock lent the name as the Hip-Hop unconformity.

It was considered that the top of the pyroclastics was a weathered sill as this contained dolerite specimens. To the left of the sill were older Precambrian spheroidally weathered lumps. The relief of the Precambrian surface was being re-exposed here and the basal conglomerate contained many fragments of the Precambrian. Larger boulders were found further up in the Cambrian. There was yet more discussion and

rock hunting where a bifurcated sill was discovered.

The day was now drawing to a close but we still had one final quarry to visit - Woodlands Quarry, Hartshill which is an SSSI. One section of this quarry contains first shelly fossils of Britain. At about 3mm long they were not the easiest to spot. There is a continuous sequence of beds ranging from non-fossiliferous to a bed (the Woodlands Member) where the shelly fauna first becomes abundant. Although hammering is not permitted some lucky members did find one or two of the fossils lying around in the talus - they are hard to see even with a hand lens.

It had been a glorious day and we must express thanks to Dot Hill of Walton Hall who organised the event, and of course to Dr Richard Thorpe for leading such an excellent field trip. One of the advantages of joint trips is that you meet members from other branches and make more friends. Field trips are worth the effort, for the socialisation, the enjoyment and what can be learnt about an area - so if you haven't been on a field trip come and join us and see for yourselves what we do.

This article first appeared in Chippings, the newsletter of the East Midlands Branch of the Open University Geological Society, and was, unhappily, the last field trip which Richard was able to lead for us. He had accepted an invitation to be one of the Lit & Phil speakers next year, but whilst leading an Open University research trip to an area of one of his main interests, the Tertiary Volcanic Province, this time to Lundy, on 22nd August he suffered a heart attack, and was flown to the mainland but pronounced dead on arrival at hospital.

He leaves a wife and colleague, Dr Olwen Williams-Thorpe, an archaeologist and a son, Ben, to whom we extend our sympathies.

Charnia Diary 91-92

Here are the events of the Lit & Phil, the East Midlands Geological Society, the Stamford and District Geological Society and the East Midlands Branch of the Open University Geological Society. Anyone will be made welcome at any event, but in case of any last-minute changes of plan it would be wise to telephone the organiser first to confirm arrangements. As we do, there may be a small additional charge for non-members of a society.

Wednesday November 20th - **Dr. Peter Regan Lecturer in Geology** at the Derbyshire College of Further Education **A Geology tour of Peru**. As well as his interest in Peru he is also undertaking work in Iceland. In this talk we can look forward to a tour through the Peruvian Andes. Lit & Phil Meeting in the Council Room of Leicester Museum (Back Entrance), New Walk, Leicester, coffee at 7.00pm, meeting 7.30pm. Non Members 50p.

Sunday November 24. Open University Geological Society National A.G.M. field trip in Charnwood and led by **Dr Mike le Bas**.
Contact John Colby (0455) 290271

Wednesday December 4th - **Pre-Christmas Members Evening**, bring your own slides, specimens, food, drink. We are looking for offers in any of the above categories. Lit & Phil Meeting in the Council Room of Leicester Museum (Back Entrance), New Walk, Leicester, from 7.00pm.

Friday - Sunday December 6th, 7th, 8th - **Snowflake 91** - The Open University Geological Society Winter Weekend to The Mendips and Coastal Exposures along the Bristol Channel. Cost £60.00 for the weekend. See article for more details.

Book with Sandy Colby on (0455) 290271

Friday 13th December - Lecture by **Dr Tony Waltham**, Nottingham Polytechnic,

"Glaciers, Burning Springs and Very Big Landslides in the Himalayas. followed by wine and cheese and a social gathering. East Midlands Geological Society. The Lecture Theatre in the old Geology Department, University of Nottingham, 6.30 pm.

Contact Jack Fryer (0400) 81585

Thursday 9th January - Lecture by **Harold Beadle** on **"The Channel Tunnel"**. Stamford and District Geological Society.

Contact Pauline Dawn (0780) 64714

Wednesday January 15th - Lecture by **Dr Mike Taylor** of Leicestershire Museums, **"Fossil and Meteor Hunting in Germany."** Lit & Phil Meeting in the Council Room of Leicester Museum (Back Entrance), New Walk, Leicester, coffee at 7.00pm, meeting 7.30pm. Non Members 50p.

Friday 17th January - Lecture by **Dr R. J. Aldridge**, University of Leicester, **"Conodonts, microscopic forerunners of the vertebrates?"**. East Midlands Geological Society. The Lecture Theatre in the old Geology Department, University of Nottingham, 6.30 pm.

Contact Jack Fryer (0400) 81585

Wednesday January 29th - Lecture **"The Natural History of the Mammoth"** by **Dr Adrian Lister** of the University of Cambridge. Lit & Phil Meeting in the Council Room of Leicester Museum (Back Entrance), New Walk, Leicester, coffee at 7.00pm, meeting 7.30pm. Non Members 50p.

January/February 1992. Open University Geological Society Day School(s), **Palaeo 92** on Fossils, concerning mainly the collecting, labelling and curation of fossils, preservation techniques and like subjects. Locations and dates to be decided.

Contact John Colby (0455) 290271

Saturday 8th February - Presidential address **Dr Neil Aitkenhead**, British Geological

Survey. East Midlands Geological Society. The Lecture Theatre in the old Geology Department, University of Nottingham, 5.00pm.

Contact Jack Fryer (0400) 81585

Wednesday February 12th - Lecture **"Ancient Mining in India"** by **Lynn Willies**. Lit & Phil Meeting in the Council Room of Leicester Museum (Back Entrance), New Walk, Leicester, coffee at 7.00pm, meeting 7.30pm. Non Member 50p.

Wednesday February 26th - **Members Evening**. Members slides, demonstrations and short talks. Lit & Phil Meeting in the Council Room of Leicester Museum (Back Entrance), New Walk, Leicester, coffee at 7.00pm, meeting 7.30pm. Non Members 50p.

Down of the Dinosaurs

A Special Exhibition, originally at Plymouth this year at the time of the British Association for the Advancement of Science meeting, is being moved to Leicestershire Museum during the period 29th February - 25th April 1992. This exhibition concerns the first identification and naming of the dinosaur (and some of it concerns itself with the extinction of the said beasts). The presence of this exhibition puts Leicester and its resident specialists in the forefront of big reptile science, coming had on the heels of Sea Dragons last year. The next issue of Charnia will have more details.

Monday March 2nd - **Parent Body Joint Meeting:** Diane Sutherland of Leicester University **"Radon in Midland Sedimentary Rocks"**. Lit & Phil Meeting in the Council

Room of Leicester Museum (Back Entrance), New Walk, Leicester, coffee at 7.30pm, meeting 8.00pm. Non Members 50p.

Saturday 7th March - Lecture by **Mr. R. E. Brown**, British Coal, **"The Jurassic Coal Measures of Iran"**. East Midlands Geological Society. The Lecture Theatre in the old Geology Department, University of Nottingham, 6.30 pm.

Contact Jack Fryer (0400) 81585

Wednesday March 11th - **Dr Robert King** of the John Moore Museum, Tewkesbury. **"Geology and Mineralogy of the Caldbeck Fells"** Lit & Phil Meeting in the Council Room of Leicester Museum (Back Entrance), New Walk, Leicester, coffee at 7.00pm, meeting 7.30pm. Non Members 50p.

March (a Sunday) - **Basic Geology** - Open University Geological Society field trip to either Lathkill Dale (just South of Bakewell) or Stoney Middleton or similar locality.

Contact John Colby (0455) 290271

Wednesday March 25th - **Annual General Meeting** and Chairman's Address, **Mr Colin Green**. **"The Geology of H2O"** Lit & Phil Meeting in the Council Room of Leicester Museum (Back Entrance), New Walk, Leicester, coffee at 7.00pm, meeting 7.30pm. Non Members 50p.

Vaughan College Saturday School,
14th March 1992

Dawn of the Dinosaurs

Mike Taylor, Arthur Cruikshank and John Martin will be presenting a day-long talk in association with this exhibition. Full details and an application form will be in the next issue of Charnia.

Charnia Diary - Continued

Tuesday March 31st - Thursday 2nd April - English Nature Special Meeting. **Conserving Britain's Mineralogical Heritage**, University of Manchester. See article in this issue for details.

Contact Dr Des O'Halloran (0733) 62626

Thursday April 2nd - Field Excursion - **Coniston Area**. In association with the English Nature Special Meeting. See article for further details. Cost £16.00

Contact Dr Des O'Halloran (0733) 62626

Early April (a Sunday) - **Basic Mapping** - Open University Geological Society Field trip to either Lathkill Dale (just South of Bakewell) or Stoney Middleton or similar locality.

Contact John Colby (0455) 290271

Monday April 20th - Saturday April 25th - Open University Geological Society trip **Caledonia 92 to Assynt**. This is one of the classical areas of British Geology. Staying at the Inchnadamph Hotel, cost £180.00 Led by David Wright of Oxford University. See article for further details.

Contact John Colby (0455) 290271

Thursday May 14th - Sunday 17th May - English Nature Conference. **"Conserving our Landscape, Evolving Landforms and Ice Age Heritage"**, Crewe. See article in this issue for details.

Contact Jo Collinge (0733) 318322

May (a Sunday) - **South Ferriby** with Dr **Simon Knell** of Scunthorpe Museum, including a visit to the by then newly opened Geological Display at the Museum. - Open University Geological Society Field trip.

Contact John Colby (0455) 290271

Saturday 16th May - Field Excursion - **River, Coastal and Mineral Extraction Sites in Cheshire/Merseyside**. In association with

the English Nature Conference. See article for further details. Cost £35.00

Contact Jo Collinge (0733) 318322

Sunday 17th May - Field Excursion - **Upland Sites in the Peak National Park**. In association with the English Nature Conference. See article for further details. Cost £35.00

Contact Jo Collinge (0733) 318322

Advance Notice:

Open University Geological Society
National Symposium 1992

**Roches sans Frontiers -
connecting Britain and
Europe**

University of Exeter,

Friday 10th - Sunday 10th July

Contact John Colby (0455) 290271

Contributors Profile:

Dr Trevor Ford, Department of Geology, University of Leicester. Article on Charnia masoni

Kate Pontin, Education Officer, Leicestershire Museum and Art Gallery. Information on Dawn of the Dinosaurs.

Graham Stocks, teacher, for production supervision.

Helma Tasker, geology student and retired teacher, article on mapping in Charnwood.

Alan Dawn, Amateur Palaeontologist, for Lit & Phil field trips.

Joe King, for contribution from Boeing.

Sandy Colby, psychology graduate and school administrator, for suffering all this in the cause of science and for Judkins Quarry and Writhlington.

John Colby, Editor, Computer Consultant and amateur GeoFreak - soon to be certified under a section of the Mental Health Act unless more people send in contributions.

ENGLISH NATURE CONSERVATION

CONSERVING BRITAIN'S MINERALOGICAL HERITAGE

SPECIAL MEETING
31 March - 2 April 1992
University of Manchester

The sites of mining activity are an important part of the natural and man-made heritage of Britain. They attract the interest of mineralogists, archaeologists, historians, botanists, mineral collectors, mining companies, planners, tourist entrepreneurs and of course the general public. The Meeting will look at how best to conserve mineralogical sites, in the face of increasing threat, as a resource for research, study and recreation. It will bring together all those who use, own or manage the sites to share their concerns and examine ways of working together. The proceedings will be organised around three themes:

- ☐ Who are the users of mineralogical/mine sites?
- ☐ Threats and conflicts.
- ☐ Ways of working together.

The provisional programme is:

31 March 1992

am Field excursion - Alderley Edge

pm Seminar 1 - University of Manchester

1 April 1992

am Seminar 2 - University of Manchester

pm Seminar 3 - University of Manchester

2 April 1992

all day - Field excursion - Coniston area

Closing date 3 February 1992

For further information contact:

Dr Des O'Halloran
Joint Nature Conservation Committee
Monkstone House
Peterborough. PE1 1JY
Telephone (0733) 62626

CONSERVING OUR LANDSCAPE:

EVOLVING LANDFORMS AND ICE AGE HERITAGE

14-17 May 1992
Crewe, Cheshire

This wide-ranging conference will consider all aspects of the conservation of landforms and Quaternary features. It will consist of a single day of presentations followed by two days of field based studies and discussions. Subjects will include the conservation of:

- ☐ River systems and coastal features.
- ☐ Man made exposures and mineral extraction sites
- ☐ Upland landscapes and deposits.

The two day programme of field visits will include:

- ☐ Active river systems.
- ☐ Disused mineral workings in Pleistocene deposits.
- ☐ Coastal sections.
- ☐ Upland landforms and deposits
- ☐ Landslip and engineering impacts
- ☐ Karst and caves.

The Peak District and the Cheshire Plain have been chosen for the focus of this conference, which will be based at Crewe.

Closing date 31 November 1991:

For further information contact:

Jo Collinge
English Nature
Northminster House
Peterborough. PE1 1UA
Telephone (0733) 318322

Information supplied by
Chris Stevens
Meetings Secretary
Head of Earth Sciences
English Nature

Caledonia 92

A Week in Assynt

Walk through 2,200 million years of Earth history!! Sedimentary, metamorphic and igneous rocks, folds and faults

Assynt is one of the great classical areas of geology, and holds the key to understanding the tectonic history of the N.W. Highlands of Scotland. Here vast sheets or nappes of country rock have been driven great distances along major thrust planes, so that older rocks now lie unconformably above younger ones. The various lithologies involved are distinctive, however, and this facilitates recognition of the structure and history of events.

We shall look at the three distinct structural units that have been created - the unmoved foreland, the belt of complication and the Moine schists. At the end of the trip you will be able to recognise the major rock types, understand their depositional or emplacement histories, and have an appreciation of the earth movements and subsequent structures created by the closure of the Iapetus Ocean.

DAY 1 - SCOURIEMUIR, SCOURIE

Introducing the oldest rocks of Britain (c.2,700Ma), this location will show us the granulite-facies Lewisian Gneiss. Predominantly grey pyroxene-gneiss, there are also abundant intermediate, garnet bearing basic and ultrabasic lenses. We shall look at the mineralogy and internal structures of the gneiss.

At Scourie we shall see the alluvial-fluvial Torridonian Sandstones (c.800Ma) lying

unconformably over the continental surface of the gneiss, and then follow the section up-sequence, including the enigmatic 'Stac Fada Member', thought to represent a Lahar deposit.

DAY 2 - N. ASSYNT SHORE, SKIAG BRIDGE, INCHNADAMPH

Walk through the Cambrian succession from the transgressive Basal Quartzite double-unconformity to carbonate platformal sequence. Varied and distinctive lithologies will be seen in normal succession and in imbricate thrust packages. An elementary mapping exercise may be included. There will be an opportunity to see examples of thrusting and folding in the complex area of the imbricate stack.

DAY 3 - KNOCKAN CRAG, MOINE THRUST, GLENCOUL THRUST

1) Visit this internationally famous site, where Murchison and Nicol, and later Geikie and Lapworth argued about how to explain the rock sequence exposed near Knockan. The controversy was eventually resolved in Lapworth's favour by the demonstration that great wedges of metamorphic rock types have been driven over unaltered rocks in the creation of a mountain chain, linked to ocean closure.

2) Place your hand on the Glencoul Thrust Plane! Gneiss has been carried over a foreland succession within the belt of complication. Also view the Glencoul stack.

3) Borolanite Quarry: Specimen hunting visit for examples of this exotic rock type. Part of the alkaline intrusive series, a porphyritic rock with orthoclase phenocrysts, leucite, melanite garnets, green biotite and nepheline.

DAY 4 - LAXFORD BRIDGE, BALNAKIEL BAY

Granitisation of the gneiss has occurred in several localities, and is particularly well seen in road-cuts near Laxford Bridge.

The Eilean Dubh Formation is famous for its unusual sedimentology: although unfossiliferous it contains a wide variety of stromatolites. We shall examine these, and look at various facies types and shallowing-upward cycles of sedimentation in an attempt to reconstruct the palaeoenvironment (Balnakiel Bay).

**Monday - Saturday
20th - 25th April
1992.**

Led by David Wright

David Wright lives in Nottingham and is currently up at Oxford researching the correlation between the stromatolite sequences in North West Scotland and those in Newfoundland for his PhD thesis, which is to be presented in 1992.

Staying at the Inchnadamph Hotel, transport by shared car or minibus from the Midlands, and with a possibility of stopovers on the way up and back. Cost (without stopovers) £180.00. Places are limited, so early booking is essential. Deposit of £20.00 per person is required to secure a place.

Contact for enquiries and bookings:

Sandy Colby

**The Dog House, 4 Ambion Rise
Market Bosworth, Nuneaton
Warwickshire. CV13 0NY
Telephone Market Bosworth
(0455) 290271**

**Open University
Geological Society**



**6-8th December 1991
Weston Super Mare**

Snowflake is the generic name for the Open University Geological Society East Midlands Winter Weekend, which this year is taking place in The Mendips and on the banks of the Bristol Channel. We are staying in an hotel in Weston-super-Mare and the weekend is being led by Open University staff member John Downes.

We are visiting Ebbor Gorge and Burrington Coombe in the Mendips on the Saturday and Weston, Portishead and Aust Cliff on the Sunday. In the Mendips we shall be looking at the depositional aspects of limestone and on the coast an igneous exposure, a Devonian/Permian unconformity and the site where the Severn Bridge was to have been built - directly over a fault!

The cost of the weekend, including all meals from Friday night to Sunday lunchtime is £60.00, and bookings are required by 24th November - so immediate action is required should you wish a place.

Contact:

**Sandy Colby
The Dog House
4 Ambion Rise, Market Bosworth,
Nuneaton, Warwickshire
Telephone (0455) 290271**

The Cambridgeshire Car Rally John Colby

An account of the trip to Little Paxton and Alwalton in August

Beneath the placid, studious exterior of amateur palaeontologist Alan Dawn lies a repressed being struggling to emerge, that of a Paris - Daccar rally driver, or maybe just an RAC rally driver. This may or may not be true, but its the way it emerges on some of our field trips. No sooner has he said "Follow me" than the red Fiesta is off on another trek along mud and sand strewn tracks, giving some nervous moments to those following - not so much "where are we going?", but "how are we going to get back?" Actually, opinion in this household is that the Fiesta is merely a bodyshell bolted onto a Land Rover chassis, with some very cunning styling to disguise the join. That being said, Alan gets us there - and back. We've never left a car yet to become fossilised.

So we meet at the Cambridgeshire roadside on the A1 at Little Paxton, the start of this week's car rally - sorry - field trip. The object is to explore the quarry workings and the exposed Oxford Clay. Again we have the usual mix, Stamford, Open University and Leicester Lit and Phil. Three miles, umpteen ponds, one heron and a sand trap later and we're all ready to go collecting. Ammonites, we are promised, and we come up with a few. Maybe they haven't come north because of the cold summer? Gryphaea we find, more than a few. Lucky really, because we want them for an Open University Revision day. Of the rest, not too great a haul. The ammonites are pyritised, and partial. Not many complete ones. Anyway its a great way to spend a morning, leaping over puddles and hoping that the solid ground is just that and not lurking in wait for the unwary boot to descend into

muddy depths. We could really do with more time, but chucking out looms. After a few hours the mud begins to cake, the thighs begin to ache, the backs begin to break and the rucksacks gain weight.

Conversation is curtailed for some by a dragline excavator desiring the spaces in which we have parked, a dragline which shows no sign of stopping. A Le Mans start and we're back across the sand trap, along the dusty, windy lane, through the first gate and STOP!!! Traffic jam. Dawn of the eagle eyes has spotted some ichthiosaur vertebrae stacked alongside the road, and we all wait in line while car doors are flung open, boots and hatchbacks gape wide and the back end of the Land Rover alias Fiesta gets slightly nearer the ground. More travel through the dust and a little circle - we've gone the wrong way - around the wagons at the end before we find the correct way out.

Unfortunately we can't get to the second quarry as the indemnity form hasn't arrived despite phone calls and other sundry pleading, so a visit to Alwalton is planned. This is a pleasant little village quite near the A1 and Peterborough on the banks of the Nene. However, there is slight detour to see an A1 fossil fuel repository. The leader takes a turn a little too soon, and leads an eleven car convoy through the forecourt of a filling station and back onto the A1 before taking the second, and correct, turn left. There was no little amazement in the garage. On the left turn (the correct one) the rally passes a Beltie Bull (Belted Galloway), black with its distinctive white wide belt. Quite cuddly

really, if you like that sort of thing. They're reputed to be very gentle. However, we don't stop to test this theory out.

First lunch, and mingling of muddy munching geologists in the village car park with wedding guests trying to make it to the church on time. A short stroll down to the river across the canal and dragon-fly spotting and the sun breaks through the clouds. Indeed its been trying to do that with increasing frequency all day, but now it becomes warm. Onto the terraced river gravels. Disturbing fishermen we find a myriad of gastropod shells and espy the other terraces dumped by the various glaciations. Collections are enhanced. Swans swim majestically along rivers lush with weed, well oxygenated because of the six foot weir just upstream. Stop on the way back to see a boat come through the lock, not gates but a raising panel in a massive guide, more like a portcullis without the holes.

"Do you want to see the Alwalton Marble?" asks James Hunt, alias Alan D. "Yes", say the accolytes, so its back up the hill, past the car park you first thought of, see the bride and groom coming out of the church to confetti and photographs, and for us its down another

path to the river. The Alwalton Marble was quarried from along the river bank and transported out by boat, and lumps are left in the river or along the bank where they were dropped. Most of these are too big to sample and they are left in peace or examined by scrambling down the river bank, but a small piece just leaps out of the ground the the left of a pair of large feet, and sits and begs to be taken home. This is too good to resist, and it conveniently identifies itself as Alwalton because foot erosion has polished a small point blue. Its quite happy in its new home, and its already house trained, coming out in the evenings to sit by the fire and have a saucer of milk and a biscuit - isn't that the way everyone treats rocks?

However, the day is drawing to a close, and we ascend the hill. This is the last field meeting of the year. The wedding party is by now celebrating and is probably under the affluence of incohol, goodbyes are said, tyres scrunch on the gravel and the car park again is left quiet with the dust settling beneath the summer trees.

Once again, thanks to Alan for a superb field season. Perhaps we shall get more Lit & Phil members along next year.



From the Alternative Geology Dictionary

Orogenesis - Origami with rocks.

Volcano - A mountain with hiccups

Mineralisation - Adding tonic to gin.

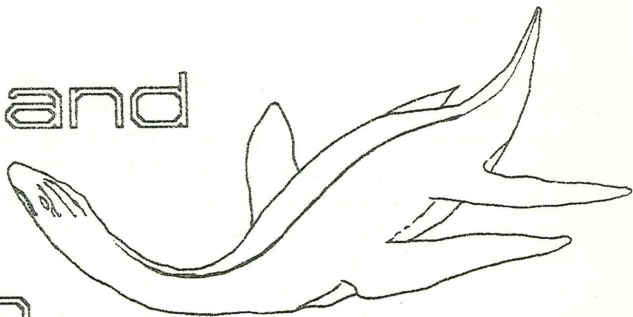
Strike - State of brain during examinations

Rock - Sand in kit form

Field Trip - The only outdoor activity where the rucksack starts out empty and finishes full.



The Thousand Year Storm



Fossil hunting with Alan Dawn is an interesting event - especially when a large vertebrate appears. John Colby

There was a humdinger of a storm. It was in the Oxfordian (157.1 - 154.7 Ma ago) in the Upper Jurassic, disturbed even the deep sea bed around Peterborough, which was at that time rather warmer than at the time we visited it in June and rather wetter, being at the bottom of the sea.

The storm has a relevance to brickmaking industry, the collections of a number of Midlands museums and Universities, the PhD theses of a fair number of people and a lot of work for Alan Dawn.

What is thought to have happened is this; during the time that the Oxford Clay was being laid down much of the area which is currently Britain was under water at a latitude of about 31°N, so the climate was quite warm. The countries occupying the latitude 31°N nowadays are places like California, Florida, the Canaries, Morocco, Israel, and the Northern Gulf. If one were considering land at the time, somewhere very like the Shatt al Arab, the confluence of the Tigris and Euphrates, the Garden of Eden.

Further graphic illustration of this area is given in Thor Heyerdahl's book 'The Tigris Expedition'.

However, Britain was then in the middle of the large continental mass of Laurasia, the Northern Atlantic was just thinking about opening (magnetic anomalies show that the oldest crust along the western seaboard of Africa and Europe and the eastern seaboard of the United States is over 160Ma old.) Sea level was about 130m above present day levels, the large reptiles ruled both land and sea, and in that sea belemnites, ammonites, corals, brachiopods and bivalves occur in large numbers. Fishes swam in shoals, probably. Microplanktonic dinoflagellates (unicellular protist with flagellae) and coccolithophores are abundant.

Here then are the fundamentals of any marine ecosystem and food chain. In terms of the larger reptiles, here are some reference dates for some of the local specimens (taken from the Leicester, Bristol and Nat. Mus. Wales publications). The Rutland Dinosaur



Some of the twenty three articulated neck vertebrae of plesiosaur Muraenosaurus. Orton Brick Pit, Peterborough.

(*Cetiosaurus*) is 175Ma old, The Westbury pliosaur (*Liopleurodon*) is 150Ma old, the Charmouth Ichthiosaur about 200Ma, the Barrow Kipper (Lias, Hettangian), 203 - 203.5 Ma, the crocodile (*Metriorhynchus*) 165Ma. These feed and scavenge on the invertebrates and on each other. Coprolite evidence shows a simple relationship - of predation; if predator is hungry and bigger and/or faster and/or more cunning than prey, prey doesn't stand much of a chance. In scavenging, if the prey is dead and tasty, it gets eaten. The number of reptilian, fish and invertebrate remains in fossil vertebrate stomachs and dung seems to suggest that most reptiles, fish and invertebrates were considered tasty by your average sea dragon.

Into this normal marine environment comes the storm. Now storms at sea are quite common. Storms of the severity of that in the Upper Jurassic are fortunately quite rare - that's why it is considered a thousand year storm.

The normal wave action in modern open oceans affects the top 20-30m of water. As there is a causal relationship between wind and waves, the greater the storm, the deeper the disturbance, and if the bed lies within the range of disturbance the bed is turbated. In our pet storm at Peterborough the bed was certainly turbated. Normally the water in the region above the bed would have been fairly anoxic. The amount of organic matter giving the clay its grey colouration (and making the Fletton brick-making process economic, as the amount of fuel used to fire the bricks is significantly reduced by the organic content of the clay burning off and fuelling the process) suggests a lack of oxygen, the presence of which would have aided bacterial decomposition of the organic remains. Ammonites, normally found whole but squashed by the settlement of the clay are broken and a just a mass of shell debris, mostly unidentifiable. The storm stirred all this up.

But what is most convenient about this bed is the ease with which it enables adjacent beds to be parted. Along this parting are the reptiles - or the remains thereof. Previous work by the brickworks that week had uncovered a nodule with a piece of ichthiosaur jaw. The clay extraction misses this layer as it is no good for the bricks - reptiles make too much phosphate. So nothing ventured, nothing gained, the author plus a couple of others start with a pickaxe and shovel on some adjacent nodules, prising them out of the ground and seeing what they contained. We were due to visit another site in the afternoon, but the subsequent events of the morning led us to decide otherwise.

"If I won the pools I'd buy one of those little excavators, a little JCB, and a trailer to tow it around."

Alan Dawn, June 1991

"We've got to move things off the dining table before we can get to eat."

Alan Dawn, October 1991

"So have we"

Sandy Colby, October 1991

Resetting the scene, its June 1st, cold - winter woolies cold, and we're without the said woolies, the coffee is in the car about fifteen minutes walk and a climb away, and there's a lot of people digging away at the cliff face. There's three of us attacking the man-sized lumps on the quarry floor. The first nodule is just that - a nodule. The second nodule (weighing in at about a quarter of a tonne, but it felt much heavier) provided the first clue. There were some brown bits with some sort of internal structure.

We prised the maestro away from the shrimp hunt in the cliff and in true Dawn fashion, he said, yes, carry on digging. In true Dawn pupil fashion we did as instructed and carried on digging. The maestro went back shrimping.

The Thousand Year Storm

Outcrop of the Jurassic in Britain



A few more pickaxe strokes later and "is this a vertebra?" "How's your eye of faith?". So the maestro was again called upon. Yes these were vertebrae - and this time he didn't go back shrimping - instead the shrimpers gravitated towards the now widening hole in the ground and trowels, brushes, hammers and other instruments of torture were brought to play upon the remains. More vertebrae emerged, five in all - and other bones - a paddle, some smaller vertebrae which disappeared under another concretion - bear in mind that all this took a good few hours. Backs were bent to shovels clearing away debris and enlarging the hole. Bricks were placed around the area so we shouldn't step on our own work - and another paddle came to light - the neck vertebrae were increasing in number, the sun had come out and all thought of visiting the other quarry had disappeared.

Lunch was a hurried affair and the digging resumed. Lettuce boxes, courtesy of Sainsbury's, became the transport for the remains of the plesiosaur to Peterborough Museum, or its Stamford annexe, otherwise known as Alan's house.

So why is the storm important? In such a storm, not only is the sea bed disturbed but also the sea and animals living therein. If your normally stable world was being tossed about you'd get quite disturbed. Thor Heyerdhal again (Kon-Tiki) gives an account of marine life during a storm - its called survival, and during this type of storm much doesn't survive, whether it be through drowning (the sea dragons were air breathing) or getting thrown about by the waves, having their necks broken or other fatal injury, or just being eaten. It is certainly on this turbated layer that a large number of reptile remains have been found. It is fortunate that the workings of the clay extraction stops just above this layer, leaving it clear (for a time) for discovery.

It is fortunate that we have the Brickpits in such close proximity, the co-operation of the London Brick Company and Peterborough Museum as somewhere to house the finds, and the leadership of Alan Dawn. Thanks to all.

Post Script: The score for the day was - two complete fore flippers (one completely articulated, one less so), five lumbar vertebrae, twenty three neck vertebrae in articulation, a portion of tail and some broken ribs. Also the aforementioned concretion has since been brought out of the quarry and is awaiting attack. Identification has been carried out - its a *Muraenosaurus*.

Post-Post script: Again it was sad that Lit & Phil members were severely outnumbered by Stamford and Open University people. Just what does it take to prise people out of Leicester?

Last Trip to Writhington? Sandy & John Colby

Writhington Geological Nature Reserve lies near Radstock, nearly on the border of Avon and Somerset. It is reached via the village of Peasedown St John, the first part of the name being indicative of the weather on the morning of our visit in early October.

The reserve is on the site of an old mine tip, where the GA has purchased 3000 tonnes of fossiliferous rock for collecting, research and educational purposes, and for this trip we were led by Dr Ed Jarzembowski of the Booth Museum of Natural History, Brighton.

Coal has been mined at Writhington Colliery since 1829, and mining activity ceased in 1973. A 1900ft shaft was necessary to reach the Farrington group, from whence it is thought the majority of the rocks exposed on the tip originate. The seams are only a couple of feet thick, and the remains found are of the layers above the main seams, the roof shales, from Westphalian D stage of the Upper Carboniferous, about 300Ma old.

The weather started out quite fine when we left home, but soon turned to rain, and seeing the M5 through working windscreen wipers was not the most pleasant of sights. Saturday morning Bath was a hold up, as was getting lost on the diversionary route to Exeter. (I blame the navigator). However, a collection of cars along a lane told their story of an imminent gathering, and the shapes of damp rucksacked backs peering in a car boot said that we had arrived.

Handouts were given out, financial contributions made and we were despatched to follow the sound of clinking hammers. Now there's one thing about a coal tip - its very dirty. And when the weather turned the tap on it was dirty and muddy. However by this time

the bug had bit, and rain was prevented from obscuring the vision too much by turning round and letting the back of the cagoule take the punishment. Unfortunately the cagoule isn't as waterproof as it once was, and a little water (it felt like four gallons) found its way in and down the neck. The only remedy was to wait for it to stop raining and take an early lunch.

Fortunately foresight had provided changes of clothing, so in brightening weather we ascended the little hill to attack rocks again. There's not much more to describe of the day - just find a rock, split it and see what's inside. However it is a little disappointing to find people whose only purpose in coming to a site bought by the GA with help from the Palaeontological Association was to collect specimens for sale.

Throughout the day we were asked to examine all our finds for insect remains, that being the speciality of the leader, but only two people found anything which could be said to resemble an insect. However, the plant finds were very spectacular, and finely detailed. The loot list includes specimens of Altheopteris serli (seed fern), Pecopteris (true fern), Lobatopteris camertonensis, Annularia (leaves), Asterophyllites (leaves) both of Calmites, and Cordaitanthus, all very finely detailed.

Poetry was quoted, that of the winner of the unofficial limerick competition of one week of the Open University Geology Summer School. (It was handed to me by one of my colleagues saying that he thought I'd like it, with the signature "Anon"). The field notebook of the leader was hurriedly brought out of hiding to record the following:

A soft bodied mollusc called Fred,
Wondered how he'd be known when long dead.
So he frolicked around
In the soft, muddy ground,
And bioturbated his bed.

Dawn of the Dinosaurs

A special exhibition, "The Dawn of the Dinosaurs", is coming to New Walk Museum, Leicester, from 29 February to 26 April 1992. It will be about the origin of the dinosaurs during the Triassic Era 240 million years ago, and the discovery of the dinosaurs 150 years ago.

The great scientist Richard Owen realised that the English fossils he was studying were the remains of strange animals, larger than living reptiles such as lizards and he called them the Dinosauria, from the Greek for Terrible Lizard. Everyone has assumed that Owen announced his discovery at a lecture in Plymouth in 1841 - hence the dinosaur stamps, TV series and books that have come out to mark this sesquicentenary in 1991. But the latest research shows that he actually slipped the Dinosaurs into the written version of the talk published in 1842, so we are celebrating the real 150th birthday of the dinosaurs!

The exhibition, currently at Plymouth City Museum, shows what it was like for Victorian scientists studying fossils. It also looks at today's ideas about dinosaurs and their Triassic contemporaries such as rhynosaurs and marine reptiles. As much of Leicestershire lies in Triassic rocks, the exhibition is highly relevant to the local area.

We plan a series of events including possibly:

- public opening and fossil festival
- family lectures
- children's holiday activities
- adult education classes
- free information leaflet
- collaboration with Leicestershire Libraries and Information service

Gallery sessions and workshops will be offered. Information sheets in Braille and the main Asian languages are in preparation. There will be an entry charge of £1.00 (50p for children and unwaged).

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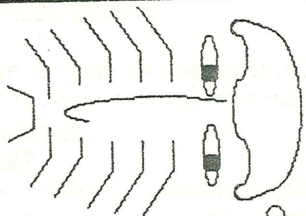
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The next issue of Charnia will appear early in the New Year. Unless you want more of the same, the editor is still pleading for articles!

The Rutland Dinosaur in the Museum met with a slight accident over the summer when his leg fell off. He's O.K. now, but Lit & Phil heard about his injury.

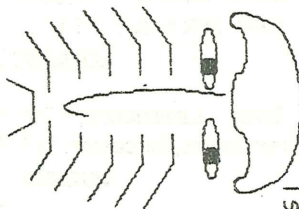
Lit and Phil

Yes, apparently it slipped its leash during walkies.

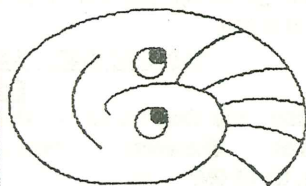


I see that the Cetiosaurus has met with an accident!

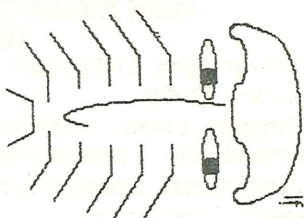
I'm surprised they don't take it on field trips.



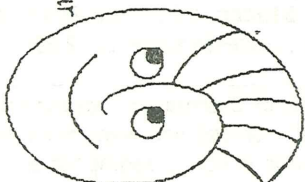
I suppose they take it up to Victoria Park.



Imagine a dinosaur wearing a hard hat!



If they did, it'd be a bit difficult.



John Colby

The heaviest element known to science was recently discovered by Boeing physicists. The element, tentatively named Administratium, has no protons or electrons and thus has an atomic number of 0 (zero). However it does have one neutron, 125 assistant neutrons, 75 vice neutrons and 111 assistant vice neutrons. This gives an atomic mass of 312. These 312 particles are held together by a force that involves the continuous exchange of meson-like particles called morons.

Since it has no electrons, Administratium is inert. However, it can be detected chemically as it impedes every reaction it comes into contact with. According to the discoverers, a minute amount of Administratium caused one reaction to take over four days to complete when it would normally have occurred in less than one second. Administratium has a normal half-life of approximately three years, at which time it does not actually decay but instead undergoes a reorganization in which assistant neutrons, vice neutrons and assistant vice neutrons exchange places. Some studies have shown that atomic mass actually increases after each reorganization.

Research at other laboratories indicates that Administratium occurs naturally in the atmosphere. It tends to concentrate at certain points such as government agencies, large corporations and universities and can usually be found in the newest, best appointed and best maintained buildings.

Scientists point out that Administratium is known to be toxic at any level of concentration and can easily destroy any productive reaction where it is allowed to accumulate. Attempts are being made to determine how Administratium can be controlled to prevent irreversible damage, but results to date are not promising.

