

CHARNIA

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The Pembrokeshire coast near St Davids

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

September 2012

www.charnia.org.uk

When considering field trips to areas with public access, it will be up to individual field trip leaders to let you know beforehand which items of PPE will be required. In common with any outdoor activity, the appropriate clothing and footwear should be worn; the relevant map and a compass should be taken, together with sufficient food and drink if it is an all-day outing. It is also good practice to make sure that your hammers and chisels are in good condition; i.e. with no obvious cracks or significant burrs.

Frank Ince



The gospel according to Maurice (Baddesley Clinton church)

All photographs in Charnia are by the Editor (Andrew Swift), unless otherwise credited

Editorial, September 2012

Well, what a rotten summer! We had to be very patient this year to see even a glimpse of what a ‘normal’ summer should be like, when there was a good spell at the start of September. But then we never get normal summers anymore, do we? Sadly the excursion to Bantycok Quarry at Newark on July 7th was a casualty of the weather, but all is not lost as this will now take place on September 29th.

You will find the new winter programme later in Charnia, and as you’ll see, there are some super lectures coming up. Frankly, I can’t see how you can allow yourselves to miss any, but I hope you will make a special note of the Saturday Seminar on March 2nd next year. 2012 sees Trevor Ford’s 60th year of his association with the Geology Section and also the Geology Department at the University. Yes, it was 1952 that Trevor came to Leicester, and here he is still contributing important new work to the geological canon, and lending his unstinting support to the Geology Section in his role as Honorary Vice-President. That’s quite some record and we are proud to follow up an idea of the Chairman’s that we celebrate Trevor’s achievements by dedicating the Saturday Seminar to him. Typically, Trevor immediately coined a title for the day – the Ford Fiesta! The final title will be a little less flippant but its unofficial title will live on I suspect. With much help from Trevor we are gathering together a glittering array of speakers, who know Trevor well and have been his students, colleagues and/or collaborators over those 60 years, so miss this one at your peril.

While on the subject of the winter programme, please make a special note that the Parent Body lecture on Monday November 12th will take place in the Hugh Aston Building at De Montfort University. This is because New Walk Museum will be unavailable at that time. As ever, we have a cracking talk lined up, which will be given by Professor Jenny Clack, who featured in the recent series of Beautiful Minds on TV.

On September 22nd the Section will be manning a stand at the Newark Rock and Fossil Fair, one the country’s biggest geological bunfights. This notification may be too late for you by the time you receive this Charnia, but if not, it would be lovely to see some of you there, it should be a grand day out. Finally, a reminder to those of you who pay your subscription (due soon) by standing order. You will need to amend your instructions at the bank to reflect the new rates.

Andrew Swift

Field trip reports

Warwickshire Building Stones, Saturday May 5th

Leader: Maurice Rogers

Maurice is an old friend of the Section and very kindly offered to take us on a ramble through the nicer parts of Warwickshire looking at the use of the local Triassic sandstones for building. He was ably assisted by Martyn Bradley for part of the trip. We began the day at Baddesley Clinton, a marvellous old moated manor house, these days open to the public. The party of nine was a little early for the opening of the house, but were allowed in to partake of coffee prior to our explorations.



At Baddesley Clinton

Maurice has done a lot of consultative work at Baddesley Clinton, advising on the sourcing of replacement stone for repairs and encouraging the opening of a quarry in the grounds to acquire exactly the same stone as was used for the original house. He used his influence to facilitate free entry for the party, although we didn't go inside the house itself. Maurice pointed out the areas where most renewal work had been done and how it had been undertaken, and then we paused for lunch. That gave us the opportunity to browse the book fair that was underway in the grounds. Before leaving Baddesley we walked to the site of the quarry where there were still pieces of Arden Sandstone we could examine, despite the quarry now being filled in.

Worssam, B. and Old, R. 1988. Geology of the country around Coalville. B.G.S. Sheet 55

Watts, W.W. 1947. *Geology of the Ancient Rocks of Charnwood Forest*. Leicester Literary & Philosophical Society.

Acknowledgements

I would like to thank John Carney, Bernard Worssam and Robin Old for very helpful discussions. Also Aron Bowers and Andrew Johnson for looking for more fossils.

Helen Boynton

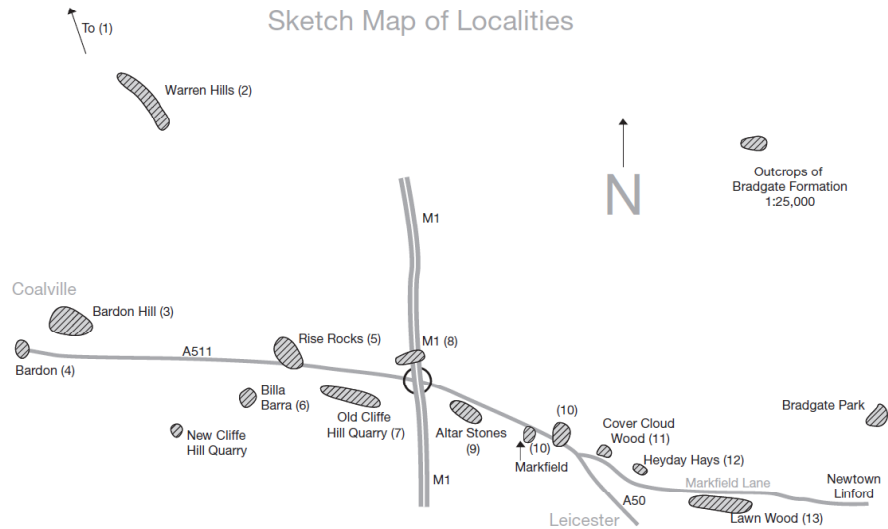
Safety Matters

Long gone are the days when one could roll up to a working quarry or mine and expect to be given permission to wander around on an unsupervised visit wearing a T-shirt, jeans and walking boots. Whilst many might think that Health and Safety precautions have gone 'over the top' in recent years, the managers of quarries or mines have to consider many aspects of their operations and it is entirely reasonable that visitors should be subject to the same working conditions as the quarry or mine employees. Bearing this in mind you should ensure that you equip yourself with the following items of personal protection equipment (PPE); DIY or engineering or outdoor stores will stock most of these items:

- safety helmet (replace your old one if it has any significant damage)
- safety spectacles (or goggles to wear over ordinary glasses)
- gloves
- high-visibility tabard or jacket
- high-visibility trousers
- steel toe-capped boots (or steel toe-capped wellingtons)
- head lamp and battery (for underground visits; for LED head torches consider carrying some spare batteries)

It is possible that some of these items of PPE will not be required at every quarry or mine that we visit; however, to ensure that you are not excluded from any field trip, all of these items should be brought to any visit to a working quarry or mine.

bands. There were few good bedding planes exposed and studied in this project. The exception to this is Old Cliffe Hill Quarry where the sediments are distal turbidites and were probably not laid down in the path of the ashes from the volcanic centres, so marine creatures could live in a more favourable environment.



References

- Ambrose, K *et al.* Exploring the landscape of Charnwood Forest and Mountsorrel - a walkers guide. B.G.S.
- Boynton, H.E. 2006, Re-evaluation of the holotype *Cyclomedusa cliffi* from the Precambrian of Cliffe Hill Quarry. *Mercian Geologist*, **16**, p.197.
- Boynton, H.E. and Ford, T.D. 1995. Discoveries of new fossils from the Precambrian (Charnian Supergroup) of Charnwood Forest, Leics. *Mercian Geologist*, **13**, 165-183.
- Scotney, P.M., Carney, J.N. and Harwood, M. 2012. New information on Neoproterozoic-Cambrian geology and the Triassic unconformity around Groby, southern Charnwood Forest, UK. *Proc. Yorks Geol. Soc.* **59**, 37-55.
- Geological Conservation Review. 2000. *Precambrian Rocks of England & Wales*.

Our next stop was Haseley church, where we were joined by Martyn. This is a characterful old church with a colourful array of local stone in the fabric, no less than three local sandstones, all different colours. Onwards then to Shrewley canal cutting, or at least some of the party proceeded thence. Others, (no names), thought the next stop was at Rowington church and went there. A phone call or two put that right and the strays reunited with the rest of the party at the cutting, where we saw exposures of Arden Sandstone.



At Brodie's grave at Rowington

Shrewley is an important locality because fossils, otherwise very rare in the Midlands Triassic, are found here. They indicate a brackish environment and therefore some marine influence during Mercia Mudstone times. Rowington was the next stop, another very fine church with very ancient roots. Although this was primarily a geology trip, we enjoyed a tour of the church and tea with the enthusiastic verger before paying homage at the grave of that pioneer of Midlands geology, the Rev'd Peter Bellinger Brodie, for many decades the vicar at Rowington until his death in 1897. He was very broad in his geological interests but did important work on fossil insects as well as many studies (famous for their very long titles) on Mesozoic stratigraphy and palaeontology in the Midlands.

Most of the party, after due thanks had been given to Maurice and Martyn, dispersed homewards, but a few of us joined the leaders in a pleasant walk to the canal at Rowington. A rather neglected aspect of our field excursions these days is the post-trip pub stop, so some of us put that right with a brief stop at the Boot Inn in Lapworth before going our separate ways.

Andrew Swift

Weekend in Pembrokeshire, Friday June 1st – Sunday June 3rd

Leader: Charlie Bendall (Aberystwyth University)

We had a long drive for our 2012 weekend excursion, all the way to St David's in Pembrokeshire, but it was worth it. Those who made an early start were able to meet up on the cliffs at Caerfai Bay at around 3.00pm on the Friday, and enjoyed a lovely sunny clifftop walk to the site of an iron age fort, during which we saw some excellent natural history including choughs and seals. The official assembly of the 13 strong party was at 8.00pm in the Farmer's Arms in St Davids, where we met our leader, Charlie Bendall from Aberystwyth, who gave us a rundown of what we could expect to see during the weekend. Being chiefly a structural geologist, unsurprisingly that would be the main thrust of the weekend. As it was fairly fine we sat outside for our introductory talk.



The sun shines on us at Broadhaven

photo Roger Latham

Saturday began fine and bright and we proceeded first to Broadhaven where the Carboniferous Coal Measures rocks had been twisted and thrust

exposed bedding plane down through two bands of Sliding Stones Slump Breccias which show clasts up to a metre in length interbedded with finer grained tuffs. It is in these finer grained beds that a specimen of what looks like *Charniodiscus* was found by Aron Bowers, very recently.

10. Two outcrops at Markfield were also mapped by Worssam and Old. The western one has now disappeared under buildings and the eastern one which showed SSSB and banded slates, is overgrown.

11. At the **junction of the A50 and Markfield Lane is Cover Cloud** wood where Watts first noted very strongly cleaved tuff breccias with bedded clasts up to a metre and rhyolite fragments which were underlain by coarse tuffs dipping at 69-70° SW, the high dips indicating the probable presence of a small fault. A recent visit showed the outcrops were now overgrown and covered with moss.

12. Just east of 11 are the grounds of Heyday Heys where a series of small bedding planes are exposed. At the base are the Beacon Hill beds, which pass up to the Sliding Stones Slump Breccia and then fairly coarse-grained unfossiliferous Bradgate Formation.

13. **Lawn Wood** is situated south of Markfield Lane and west (3) of Newtown Linford. Here Worssam and Old noted interbedded, or faulted outcrops of the unfossiliferous Bradgate Formation showing ripple cleavage, with the South Charnwood Diorites. Lawn Wood is inaccessible and belongs to the quarries of Groby Pool and Bradgate House area. A very recent paper by Scotney *et al.* has appeared in which is described the structural relationships between Bradgate Formation beds and the South Charnwood Diorites, which are thought to be intruded as a laccolith metamorphosing the sediments. There is also some reverse faulting which affects the boundary of the Charnian rocks with adjacent Coal Measures and Triassic.

Conclusion

When I started this project I initially thought there could be some possibilities of finding at least a few fossils, although none had been recorded in earlier mapping. Now one has been found! As the research proceeded, either by examining the literature, talking to colleagues or looking at the field evidence, it became evident that the beds on the western limb of the Charnian anticline were coarser and more ashy than those in the east and south. This was probably due to the closer proximity of the volcanic centres of Bardon Hill and Whitwick, whereas the highest Precambrian beds on the east and south sides consisted generally of finer tuffs (hornstones) with some coarse

top are finely graded and more thinly bedded. These upper beds have always seemed a potential for fossils, but no such luck!

7. **Old Cliffe Hill Quarry** is situated a short way south of the main line of Charnian rocks and is quarried for its diorite which is mainly faulted against the sediments which show low grade metamorphism. They consist of a sequence of fine-grained and banded rocks which are characteristic of a distal turbidite facies suitable for living organisms. The fossils here consist of a number of large ovoid, or circular, discs, some of which show bifurcating stems emerging and a number of small discs which have been stained by chlorite. Leicester Museum has six specimens, including the holotype *Cyclomedusa cliffei*, one is at B.G.S. and one in a private collection. Towards the northern end of the quarry the sediments become coarse-grained and there are no fossils. The quarry is now closed to the public.

8. **At the M1 slip road** just north of **Junction 22** Worssam and Old recorded massive slate agglomerates, underlain by coarse tuffs. They make no record of beds above the SSSB. There are a number of interesting bedding planes seen along the motorway but there is no obvious access.



Altar Stones, a fossil of *Charniodiscus*-type was found here photo Helen Boynton

9. **Altar Stones Lane** is now a cul de sac and cut off by the M1. On the north east side of the lane is a series of outcrops extending from the highest well

into fantastic folds. On then to St Bride's Bay where we saw red Devonian sandstones which had been slightly less deformed, but nevertheless still subjected to strong earth movements. Some paler conglomeratic bands excited debate, they appeared to represent periods of turbulent outwash, maybe from violent storms. The local church provided an excellent venue for lunch, and we enjoyed a sojourn in warm sunshine in the porch or churchyard.



At Marloes

The afternoon began with a fairly strenuous hike to latest Silurian exposures at Marloes. We had to park some distance away and walk at least a mile and then descend a tricky rock path to the shore, but all arrived in one piece. Here the main topic of conversation was the en echelon micro tear faults in the sandstones, which were reflected in the quartz veining. Some of us found the return journey up the steep cliff path and subsequently back to the car park fairly testing and opted out of the last exposure at St Ann's Head, where more spectacular folding could be seen.

Saturday evening featured the traditional weekend field trip meal, which took place at the Farmer's Arms. Almost everyone attended and a fine time

was had by all. Later in the evening a fierce rainstorm developed and some of us got very wet on the walk/run back to our bases at various establishments. Sunday saw the official start of celebrations for the Queen's 60th anniversary of ascending to the throne, so naturally it had to be a really awful day. We all had to don full winter clothing for our visit to Whitesands Bay, but just about managed to miss the rain, although the wind certainly blew and the temperature was very low. We walked a goodly way along the clifftop examining the much distorted Cambrian and Ordovician strata and intrusions, and enjoying what we could see of some fine views. A very well preserved ?Bronze Age settlement of round houses excited the antiquarians amongst us.



Group shot on the cliffs east of Whitesands Bay

We returned, much reduced, around lunchtime and most of us fought it out with the surfers and trippers in the beach café, which was heaving, for some lunch. Some diehards pressed on later to view the Ordovician rocks of Aberiddy Bay with the leader as the weather worsened, but most of us headed for home. The journey was horrendous as the rain that had been threatening all day finally descended in furious torrents.

Andrew Swift

thought the outcrop was in the Brand Formation, but later the B.G.S. placed it in the Bradgate Formation. North of the A50 they recorded coarse-grained tuffs and on the south side strongly cleaved tuffs cut by an 80cm dyke of ochre porphyry with a circular altered ferromanganese phenocrysts.

5. Rise (Rice) Rocks. These form prominent outcrops near Old Rise Rocks Farm which is situated on land owned by Bardon Hill Quarry where extensions are planned for the future. These outcrops will then disappear. Here Watts recalled hornstone showing white ripple cleavage, but with hackly weathered bedding plane surfaces, passing down into the Sliding Stones Slump Breccia ('Slate Agglomerate'). B.G.S. recorded outcrops with dips varying from 45°SW to 68°SW consisting of coarse-grained tuffs with clasts up to 20cm in size again with hackly bedding planes. These are interbedded with finer grained tuffs, but too coarse-grained to contain fossils.



Billa Barra, ?barren Bradgate Formation

photo Helen Boynton

6. Billa Barra Old Quarry shows a shallow synclinal structure in the Bradgate Formation. A number of very well exposed bedding planes are present and I have examined these several times, but never found any fossils. Watts here recorded ashy beds and fine agglomerates passing up into more slaty beds, and he doubtfully placed these in the Brand Formation grits. Finer interbedded beds show ripple marks and slumping. Lowest beds on the hill

as vetulicolians, and what appears to be a relative of the shell-less mollusc *Odontogriphus*.

The ongoing search for Precambrian fossils in Charnwood Forest

My search for more Precambrian fossils continues. This year it consists of examining the series of isolated outcrops on the south-western limb of the Charnian anticline, which contain beds of the Bradgate Formation where most horizons of fossils are situated, at other localities, eg. Bradgate Park, North Quarry and The Outwoods. Between 1963 and 1977 the British Geological Survey (B.G.S.) mapped the area for the Coalville sheet 155 and the accompanying memoir was published in 1988 by Worssam & Old. They and others, on mapping the area, were able to recognise the marker band, the Sliding Stones Slump Breccia (SSSB) ('Slate Agglomerate'), thus enabling them to place the slates, tuffs and hornstones above in the Bradgate Formation. The localities researched in this report are as following, starting in the north-west and extending south eastwards as far as Newtown Linford:

Bradgate Formation beds are present at:- (see Fig. 1)

1. **East of Thringstone and west of High Cademan** (walk 3 in the B.G.S. guide), here John Carney noted very few bedding plane outcrops.
2. The **Warren Hills** (walk 4) lie immediately north-east of Coalville. There is a variation in lithology starting with coarse-grained rocks of the Charnwood Lodge Bomb Rocks in the north, to lithic tuffs with slate fragments, to volcaniclastic sandstones showing white-grained weathering, in the south. In spite of some good bedding planes there were no fossils found in these coarse-grained rocks.
3. In **Bardon Hill Quarry** (now closed to the public) the Bradgate Formation outcrops in the south and consists of volcaniclastic deposits adjacent to the volcanic neck. No fossils were found here.
4. **Bardon House** (A50). A small roadside pit opposite Bardon House once showed rubbly olive to white very fine-grained hornstones, mineralised by iron along the cleavage planes. At first the potential for fossils looked promising, but before further closer examination could be made the exposure was covered over to make way for the large Birch Tree Inn roundabout. I do have one specimen still in my collection (but it is not fossiliferous). Watts

Mountsorrel Quarry, Leicestershire Sunday 24th June

Leader: Frank Ince

Our customary mid-summer evening meeting took place early on a damp Sunday morning! Ten members met at the Wood Lane entrance to Mountsorrel Quarry as guests of Lafarge. The quarry is the largest 'granite' (see below) quarry in Europe; it is currently ~200 m deep with the quarry floor being ~120 m below mean sea level. The quarry is a significant economic asset to the area and currently produces 4.5 million tonnes of crushed rock per year, primarily for the construction industry (this is down from 6 million tonnes in the recent past as the economy has slowed). Full PPE clothing was required as it seems reasonable that our protective clothing is on a par with the employees of the quarry.



The big hole

Mick and Joe were our drivers for the morning and they took us down to the base of the quarry (Level 12); looking up at the vast array of benched rock faces is quite an experience. The water pump hummed in the background as we discussed the geology of the quarry which works the igneous rocks of the Mountsorrel Complex; whilst the rock produced from the quarry is often referred to as granite, it is late-Ordovician granodiorite. Most of the granodiorite we saw was a pink-weathering, grey to pink, coarse-grained, equigranular biotite granodiorite that included some more basic,

darker grey, rounded xenoliths of equigranular diorite; there were also modest amounts of pink, fine-grained aplite. Mottled green slickenside contacts on some of the faults/joints were also quite obvious. In addition to the mineral components of the granodiorite (feldspar, quartz, and mica), we found yellowish-green crystals and fine-grained veins of epidote, some darker green masses of chlorite and small amounts of pale brass-yellow pyrite and white mica (sericite-muscovite?).



The Mountsorrel party

On moving up to Level 7, much the same suite of rocks and minerals were to be seen; although, the aplite seemed to be more common and contained some sprays of epidote up to 70 mm wide and pale brass-yellow pyrite as cube-shaped crystals in dark green chlorite. Chalcopyrite also turned up as yellow anhedral masses. On this level some of the joints contained a greenish-blue coating that remains to be identified; it is probably chlorite or a clay mineral, with the possibility that it might be tourmaline.

Our final location was one of the top benches of the quarry where the unconformity between the Ordovician granodiorite and the Triassic Mercia

cycles with known astronomical periods which can in principle allow relatively high precision calibration of the geological timescale. These projects hinge on there being reproducible and statistically significant cycles in the often noisy stratigraphic record. It is therefore of some consequence to have reliable means of detecting, assessing and/or estimating the properties of candidate cycles in the data.

We will discuss our recent work - the result of a collaboration between an astronomer and two geologists - that takes a critical look at some of the statistical tools used in the field of 'cyclostratigraphy'. The result may appear to be a 'storm in a teacup' argument about the details of this or that statistical procedure, but I will argue it has important consequences for our attempt to calibrate the geological timescale, determine the stability of the solar system, and understand long-term climate variations.

Wednesday November 28th

A Burgess Shale-type biota from the early Cambrian of Australia

Dr Gregory Edgecombe, Natural History Museum, London

Our understanding of the Cambrian Explosion and the composition of Cambrian animal communities is fundamentally informed by a few dozen sites around the world with exceptional preservation that includes non-biomineralised organisms alongside their “shelly” counterparts - Burgess Shale-type deposits. The richest of these “BSTs” in Australia, the Emu Bay Shale Lagerstätte, is located on Kangaroo Island in South Australia. Though soft-bodied fossils from the Emu Bay Shale were first found in the early 1950s and various species were formally described in the 1970s and 1990s, an excavation going on regularly since 2007 has increased the number of species known (to a total of over 50) and identified some animal groups not previously seen in Australia. The Emu Bay Shale Lagerstätte is ca 515 million years old, about 5 My younger than the Chengjiang biota of China but at least 5 My older than the Burgess Shale. About 75% of the species are non-biomineralised, though trilobites are numerically the most abundant fossils. About half the species are arthropods, including new genera related to familiar Burgess Shale taxa like *Naraoia* and *Leanchoilia*, and some genera shared only with China. The discovery of complex compound eyes of arthropods (including those of *Anomalocaris*) shows that acute vision had evolved by the early Cambrian. Highlights of non-arthropod animals include a new combination of features in the enigmatic (deuterostome?) group known

The speaker has researched tsunamis for 13 years, beginning in 1998 with the devastating event in Papua New Guinea that killed 2,200 people. Since then he has worked on numerous tsunamis including the 2004 Indian Ocean event. He has visited Japan three times since March 11th, studying the tsunami impact.

Monday November 12th Parent Body Lecture

Populating Romer's Gap: rebuilding terrestrial ecosystems after the end-Devonian mass extinction

Professor Jenny Clack, Professor and Curator of Vertebrate Palaeontology,
University Museum of Zoology, University of Cambridge

At the end of the Devonian, a mass extinction event changed the faunal composition of terrestrial, freshwater and marine faunas. The 20 million years that followed this extinction event has for more than 9 decades been seen as a fossil-poor interval, named 'Romer's Gap'. The earliest Carboniferous Tournaisian stage, however, saw the re-establishment of fully terrestrial ecosystems and the acquisition of terrestrial capability by tetrapods, as inferred from later Carboniferous Viséan stage fossils. Unfortunately, almost nothing was known from the fossil record about how this re-establishment progressed, or how terrestrial tetrapods evolved and diversified. For example, only two sites worldwide recorded tetrapod fossils from Romer's Gap, one in Nova Scotia and one in western Scotland. Now, for the first time anywhere in the world, abundant fossils of tetrapods and associated fauna including arthropods and fishes from this period have been recovered from eastern Scotland. This talk introduces some of these finds and their significance, and further work that will take place to understand the causes and consequences of the end-Devonian mass extinction and the events that followed it.

Wednesday November 14th

Detecting cycles in stratigraphic data

Dr Simon Vaughan, Dept of Physics and Astronomy, Leicester University

The detection and identification of 'cycles' in the stratigraphic record – variations that are periodic or very nearly periodic in time and/or depth dimensions – is of great importance to a number of different areas of active research. One is the detection of periodic (and arguably astronomically forced) variations in the climate. Another is the identification of sedimentary

Mudstones was well exposed; the Triassic rocks were themselves overlain by Pleistocene glacial deposits. Again the rock types we saw were similar to those seen earlier; however, there were a number of boulders of a Carboniferous dyke composed of dark green to black basalt-microgabbro. This area had undergone significant weathering and oxidation of the primary minerals had produced a range of supergene minerals. Some dark grey djurleite (?) was found on joint faces in the weathered granodiorite; although, it had been partly oxidised, resulting in the formation of small sprays of green malachite and traces of blue azurite (this was only found later; when the specimens were viewed under the microscope). Djurleite appears to be the most common grey copper sulphide that occurs in the Charnwood Forest area; however, the identification of the Mountsorrel djurleite will need to be confirmed as it is one of a series closely-related, similar-looking copper sulphides: anilite (Cu_7S_4), digenite/roxbyite (Cu_9S_5), djurleite ($\text{Cu}_{31}\text{S}_{16}$) and chalcocite (Cu_2S).



Junction with Mercia Mudstone Fm at the top of the quarry

Chalcopyrite on joint faces in the weathered granodiorite had been partly oxidised; resulting in the formation of green malachite and dark brown goethite. Pyrite on joint faces had been almost completely oxidised and small masses of dark brown goethite had been formed. White to cream coatings were found on clasts of the granodiorite in the Triassic basal breccia and joints in the granodiorite; elsewhere in the Charnwood Forest area these coatings have been shown to be palygorskite or nacrite. A few dark brown to

black dendrites on the previously mentioned white to cream coatings probably include a mixture of metallic oxides; possibly containing manganese (e.g. pyrolusite) or iron (e.g. goethite or the rather poorly defined 'limonite').

Our visit turned out to be blessed by fair weather; making it a trifle warm in our full PPE. Most of the anticipated rock types and minerals were found; although our examples of the minerals were not particularly impressive. We would like to thank Lafarge for the opportunity to visit the quarry; in particular our thanks go to Mick and Joe for ferrying us around and their patience whilst the obligatory group photographs were taken.

Frank Ince

Winter Programme, 2012-2013

All held at 7.30pm in Lecture Theatre 3, Ken Edwards Building, on the main University of Leicester campus, except where stated. Refreshments served from 7.00pm.

Details: Chairman Joanne Norris, j.e.norris@ntlworld.com, 0116 283 3127

Wednesday October 3rd

Dr Rob Ixer (Department of Geology, University of Leicester). **"I have come after them and made repair": the provenancing of Stonehenge lithics.**

Wednesday October 17th

Professor Peter Styles (School of Physical and Geographical Sciences, Keele University). **Do we need Shale Gas and what would that mean?**

Wednesday October 31st

Professor David Tappin (British Geological Survey and University College, London): **The Tohoku earthquake tsunami of March 2011.**

Monday November 12th

Parent Body Lecture, Hugh Aston Bldg, De Montfort University, Leicester.

Professor Jennifer Clack (University Museum of Zoology, University of Cambridge). **Populating Romers' Gap: rebuilding terrestrial ecosystems after the end-Devonian mass extinction.**

*** please note the venue, we are at De Montfort University

1. Bring it by pipeline from a country (ies) where gas businesses have vast wealth but support governments where political demonstration is illegal. In transit, 1.5% of methane (Greenhouse Gas potential of 72, 20 year timescale) is lost, equivalent to pumping the total volume of transported gas directly into the atmosphere as CO₂, more than is generated by actually burning it!!!.

2. Bring liquefied natural gas by Supertanker from Qatar through the Gulf of Aden past Somali pirates currently holding 17 ships hostage. From Milford Haven pipe it across Wales and use it immediately as we only have 12 days of underground storage (France/Germany c 120 days!!!) as no-one wishes new facilities to be built.

3. Generate it by drilling *carefully* to 3 kilometres into coal seams or shales underlying 30%+ of the UK, using horizontal drilling and hydraulic stimulation (fracking) and pump out natural gas. It must be carefully monitored, geochemically, hydrogeologically and seismically, to protect our water supply and environment but the UK, with arguably unparalleled legislative and regulatory frameworks, should not leave it to some other poorer and/or less scrupulous country to do the dirty work.

You may, as this IS a free country, pick 1 or 2 but if you do pick number 3 that's *Shale Gas*.

Wednesday October 31st

The Tohoku earthquake tsunami of March 2011

Professor Dave Tappin, British Geological Survey and University College, London

Do we live in the 'age of tsunamis'? With the Indian Ocean event of 2004, where 220,000 people died, the 2006, Samoa tsunami and the 2010 event in Chile, it certainly seems like it. The massively destructive tsunami that struck Japan in March this year is another such event. The impact was a surprise because usually natural disasters strike the third world and Japan is considered to be the best prepared country in the world to deal with these events. This talk presents on the different tsunami sources and the developments made in their understanding and mitigation since 2004. It then focuses on the March 11th Japan event – and how the new understandings were used to mitigate for this event.

Winter Programme abstracts 2012

Wednesday October 3rd

"I have come after them and made repair"; the provenancing of Stonehenge lithics.

Dr Rob Ixer, Department of Geology, Leicester University

The precise number, identity, geological provenance and prehistorical significance of the various Stonehenge bluestones have been, and will always remain, contentious. Petrographical re-examination (initially using 'total petrography') of lithic assemblages collected during the last century, plus examination of those from 21st century excavations, found within Stonehenge and its immediate environs (over 7000 samples) combined with dedicated, geological, *in situ* collecting has allowed a greater qualification and quantification of the rock types, demonstrated their relative archaeological 'importance' and suggested some of their possible origins. These data have shown that some earlier provenancing studies are incorrect whilst also uncovering cryptic questions including: -

- Why are some orthostats not represented in the abundant and spatially quite uniform Stonehenge 'debitage' ---and *vice versa*?
- Why are the geological origins of the non-dolerite bluestone so diverse and often from 'insignificant' outcrops for example the small outcrop of Craig Rhos-y-felin?

Continued detailed rock and mineral geochemistry plus statistical and spatial analysis of the 'debitage' may answer these and the more straightforward questions.

Wednesday October 17th

Do we need Shale Gas and what would that mean?

Professor Peter Styles, School of Physical and Geographical Sciences, Keele University

Lets assume that we need gas for the foreseeable future: to cook with (70%), to generate electricity (47%) until we can economically provide 90 Gigawatts of reliable, carbon-free energy. The North Sea no longer provides enough by 400 TWh. Where can we sustainably and ethically source our gas with probably the following options?

Wednesday November 14th

Dr Simon Vaughan (Department of Physics and Astronomy, University of Leicester). **Detecting cycles in stratigraphic data.**

Wednesday November 28th

Dr Gregory Edgecombe (Natural History Museum, London). **A Burgess Shale-type biota from the early Cambrian of Australia.**

Wednesday December 12th

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

2013

Wednesday January 9th

Dr Jonathan Lee (British Geological Survey, Keyworth). **Buried Valleys of East Anglia – ancient rivers and ice sheet drainage networks.**

Wednesday January 23rd

Dr Andrew Howard (British Geological Survey, Keyworth). **From 2D Maps to 3D Apps – geological surveys for the 21st century.**

Wednesday February 6th

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

Wednesday February 20th

Dr Howard Falcon-Lang (Royal Holloway, University of London): **Darwins lost fossils found.**

Wednesday March 6th

Dr Richard Walker (Department of Earth Sciences, University of Oxford): **Earthquakes on an urban planet: challenges for the 21st century.**

Saturday March 2nd

Annual Saturday Seminar, University of Leicester. **Dr Trevor D. Ford O.B.E: 60 years of geological achievement.**

Wednesday March 20th

Annual General Meeting and Chairman's Address by Dr Joanne Norris. **'More rocky tales of a geotechnical engineer'.**



Still hard at it, Trevor Ford at home in early June



At the bottom of the vast Mountsorrel Quarry



The Devonian cliffs at St Bride's Bay, Pembrokeshire

photo Roger Latham



Mountsorrel 'granodiorite'