

Bulletin Number 59 October 2001



NSGGA Programme of evening lectures for 2001

Thursday 11th October 2001

7 30 pm at University of Keele

School of Earth Sciences and Geography, William Smith Building

Professor Ian Fairchild (University of Keele):

Encapsulating Climatic Catastrophe: Snowball Earth

Thursday 8th November 2001

8 00 pm at University of Keele

School of Earth Sciences and Geography, William Smith Building

The Inaugural Wolverson Cope Memorial Lecture

Dr John C W Cope (Cardiff University):

A new look at the Geological Map of Britain

Please complete the [enclosed form](#) to attend the preceding buffet supper.



Tuesday 4th December 2001

7 00 pm at Staffordshire University

Room 324, Mellor Building, College Road, Stoke-on-Trent

Members Social Evening with buffet

Please complete the [enclosed form](#) to attend.

For more details about the talks please contact:

NSGGA Secretary: Dorothy Wright,

24 Elm Tree Lane, Bignall End, Stoke-on-Trent ST7 8NG ☎ 01782 721576

NSGGA Programme of evening lectures for 2002

Thursday 10th January 2002

7 30 pm at Staffordshire University

Jonathan O'Dell:

An Insight into the Geology of Central Iran

Wednesday 13th February 2002

8 00 pm at University of Keele

Joint meeting with Univ. of Keele Students' Geology Society

To be arranged.

The lecture will be preceded by a buffet supper

Thursday 14th March 2002

7 30 pm at University of Keele

Annual General Meeting and Chairman's Address

Articles & Publications

Parker, P. 2001 **

Millennium Rock update

Spaceflight 43 April 2001 p.216

A letter detailing the history of the Millennium Rock since returning to Earth on 28 August 2001

** items are available for reference (by prior appointment) at the Geological Records Centre,
Natural History, The Potteries Museum & Art Gallery, Hanley, Stoke-on-Trent ST1 3DW ☎ 01782 232323

University of Derby Research Seminars

The following take place on Thursdays, 5-6pm, in Room T115, University of Derby, Kedleston Road, Derby DE22 1GB. All are welcome. A listing of geologically orientated talks is given below. For further details and for a list of all other seminar topics please contact Dr. Andy Johnson ☎ 01332 591721 e-mail: A.L.A.Johnson@derby.ac.uk

- 11 October Leslie Munro (Swindon) - *Wet and dry ground and the environment*
- 25 October Susan Casper (Univ. of Derby) - *Trace metal contamination in the River Churnet valley*
- 8 November Clive Portman (Univ. of East Anglia) - *Sedimentology and neotectonics of the eastern Gulf of Corinth, Greece*
- 7 February Jonathan Thomson (Univ. of Derby) - *Sillimanite isograds in the Dalradian of Fraserburgh, NE Scotland*
- 28 February Dr. Stan Salmon (Univ. of Derby) - *Piecemeal formation of granite batholiths: evidence from Land's End and the Isles of Scilly*
- 7 March Cara Wedgbrow (Univ. of Derby) - *Prospects for the seasonal prediction of low river flows in England and Wales*
- 25 April Peter Jones (Univ. of Derby) - *The palaeoenvironmental significance of sub-Anglian gravel deposits in southern Derbyshire*
- 2 May Prof. Neil Hudson (Univ. of Derby) - *Aspects of the petrology of orthoamphibole gneisses from central Finland*

British Trust for Conservation Volunteers (BTCV)

The NSGGA is a member of the BTCV and regularly receives information about BTCV training courses, conservation holidays (UK and abroad), one day conservation projects (any day of the week), conservation handbooks, etc. that may be of interest to NSGGA members.

If you are interested please contact me on 01782 713227 or E Mail carol@burnett40.freeseerve.co.uk or visit the BTCV website on www.btcv.org

Carol Burnett

The Manchester Time Chart

Some of you may remember the Geological Column produced by the Manchester Museum that provided a valuable summary guide to what happened when in the geological past. This very useful publication has now been revised by Michael Eagar and John Nudds and is now again available as a folded, full colour, six-panel pamphlet. Priced at a very reasonable £1.75 each, copies are available from the Museum Shop, Manchester University Museum, Oxford Road, Manchester M13 9PL or from Geo Supplies Ltd, 49 Station Road, Chapeltown, Sheffield S35 2XE ☎ 01142 455 746 (please add 50p p&p)

Millennium Rock Update

NSGGA Member Phill Parker reports on the progress of the piece of north Staffs igneous rock that:

- flew in space for 380 days,
- was first exhibited back on Earth at The Potteries Museum & Art Gallery in late October 1999, and
- celebrated the arrival of year 2000 at NASA's Visitor Centre, Kennedy Space Center, Florida.

The Millennium Rock, its acrylic oil painting and associated display posters should be going to Abingdon Museum in October

2001 to take part in a 3 month exhibition called *2001: A Space Odyssey*. I expect further interest since Abingdon is near to Harwell and other hi-tech science and technology labs - some of which take part in space experiments themselves.

Rockwatch: Report on the visit to Blue Circle Industries Cauldon Quarry and Cement Works on Wednesday 15th August 2001

A total of 15 adults and children took part in the joint Rockwatch and NSGGA visit to the Quarry and Cement works at Waterhouses on Wednesday 15th August 2001.

Cath Molden, public relations, Colin Reid, deputy quarry manager and Paul Beetham, met the party and after having been kitted out with hard hats, high visibility waistcoats, protective goggles and ear defenders we climbed into two Land Rovers. First we went up to the top of the quarry where we could view the workings from a distance. Colin explained the quarrying process and we had an opportunity to examine some samples of rock found at the quarry. There are three SSSI sites at the quarry (two biological for the calcareous flora and fauna and one geological in the shale quarry). There is a wide variety of wildlife including badgers, buzzards, rabbits and foxes. There are 47 tree plantations on the site, which screen the site and provide a haven for wildlife.

From the top of the quarry we could see the strata dipping at varying angles and in different directions (there are multiple faults). The rocks are heavily stained red and closer examination revealed red hematite veins derived from previously overlying Permian deposits. The rock, although it is all basically limestone, varies throughout the quarry having differing amounts of iron, aluminium and magnesium. These elements have an influence on the properties of the final cement (some of them are detrimental) and must therefore be carefully controlled. Blending the amounts of the different rock does this. After the rock has been blasted from the face a digger loads it into dumper trucks, 25 tonnes at a time.

Next we went down into the quarry and watched the digger load the rock into the dumper. The men stopped work and we stood inside the bucket of the digger while Colin took our photograph. The rock from the quarry is offloaded into the primary crusher, onto a conveyor belt and through a secondary crusher before passing over the road to the cement works.

We returned to reception for a welcome cold drink and biscuits before touring the cement works.

- The whole cement making process is operated by computer from a central control room.
- Crushed rock from the quarry is stored in the raw materials store. The other main ingredients used in the process are shale (from another Blue Circle quarry close by) and sand (bought in).
- The correct amounts of these three ingredients are passed into a Raw Mill where they are ground into a fine powder called Raw Meal. The raw meal is blended and stored before passing on to the next stage of the process.
- The raw meal is passed through a series of cyclones prior to being fed into the Precalciner. In this process the raw meal is mixed with crushed coal and chipped tyres and preheated prior to going into the kiln.
- The brick lined kiln is inclined at an angle of 10°, the precalcined raw meal is fed in at the top end and a coal fired flame at the other end keeps the temperature of the kiln at approximately 2000° C. When the raw meal reaches a temperature around 1450° C a chemical reaction is triggered that results in the formation of cement clinker. The cement clinker is then cooled and stored before further processing.
- Cement is produced by grinding the clinker in ball mills with approximately 6% gypsum; the latter is added to control the setting time of the cement.
- Final product is stored in silos prior to distribution by road tanker or packed into 25 Kg sacks.

We were able to follow the whole process from start to finish, it was very hot alongside the kiln and we were glad to get out into the fresh air. After a picnic lunch in the car park we went into another small area where we were able to search for fossils in a pile of rock that had been put there for us.

Everyone thoroughly enjoyed the day, which was very informative and interesting.

Mike Fereday

John Myers Awards and Medals 2001

The winners of this year's prizes were:

Suzy Larnar of Staffordshire University and
Victoria Tunstall of Keele University

with awards to runners-up:

Lisa Dunn of Staffordshire University and
Peter Sherratt of Keele University

The fifth year of the awards honouring John Myers, Founding Father of the NSGGA, has been most successful. This has again been due to the willingness of many people to contribute their time over the year. The presentations took place in the respective Departments on Graduation Day as part of Departmental awards ceremonies, in the presence of parents, friends and staff. Ann Myatt, John Myers' daughter, presented the awards at both Universities. The two winners will be invited to attend the inaugural F. Wolverson Cope Memorial Lecture on 8 November 2001 as guests of the NSGGA. As well as an engraved medal, the two winners received an award of £100.00 each, whilst the runners-up received £20.00 each.

John Reynolds

Report on field trip to Styal Country Park on 22 July 2001

A group of Manchester GA and NSGGA members spent a very interesting afternoon on a field trip led by Fred Owen "A geological tour of Styal Country Park". Fred frequently mentioned David Thompson when referring to the geology all around us. David had done a lot of his student research in the area and his name is synonymous with the Permo-Triassic rocks of the area.

The visit was based on a geological trail guide (funded by Manchester GA) that Fred had prepared as part of his studies at the Centre for Continuing Education of the University of Manchester.

The group gathered in the Quarry Bank Mill car park and after a brief introduction by Fred we walked down into the valley of the River Bollin crossing over glacial till clay deposits laid down some 10 to 15 thousand years ago. The river has cut through these clay deposits into the underlying red sandstone of Permo-Triassic age (250 Ma). The guide has a cross section showing the Upper and Lower clay bands separated by a sand and gravel bed, the Helsby Sandstone and the Wilmslow Sandstone.

At the confluence of the Rivers Bollin and Dean we examined the flow patterns of the two rivers and the resultant ripples on the riverbed. As we walked downriver Fred pointed out various examples of sedimentary processes in the making that illustrate very clearly how sedimentary rocks were formed millions of years ago (ripple structures, graded bedding, sand bars, erosion and deposition on the bends of a meandering river, etc.).

As we progressed along the footpath through the park Fred pointed out the Wilmslow Sandstone Formation (aeolian sand dune structures) and the Helsby Sandstone Formation (sandstone and conglomerate formed in a braided river).

The weather was kind and all of us agreed that it had been a very interesting and informative afternoon, it is not often that you can see geology in the making.

Janet Fairclough

Report on field trip to the Wren's Nest and Saltwells Nature Reserve 12th August 2001

8 members of the NSGGA gathered at the Wren's Nest Nature Reserve in Dudley on Sunday morning 12th August 2001; the leader for the day was Graham Worton, Keeper of Geology at the Dudley Museum.

Graham welcomed us all and gave a brief introduction to the Wren's Nest Nature Reserve, which was the first Geological Nature Reserve to be created in the UK in 1956. The land, originally called Old Park, was the site of a hunting lodge during the reign of Henry VIII.

The main geological feature is the N-S fold pattern as opposed to the NE-SW folding of the Caledonian Orogeny or the E-W folding of the Variscan Orogeny. Earlier folds dating back to the Pre-Cambrian may have influenced the anticlinal structure of the Silurian Limestone, clays and shales. Some 650 to 700 different species of fossil have been found in the area. In addition to the geology, Graham explained some of the industrial history of the area

Extraction of the limestone by quarrying and mining at the Wren's Nest started in the early 17th century; it was originally used as a building material and burnt to provide lime for agricultural purposes. In 1665 Dud Dudley, the illegitimate son of the Earl of Dudley, was the first person to use coal for the smelting of iron and he used limestone as a flux for removal of the impurities in the iron ore. He also produced the first geological map of the Dudley area.

Note: The localities referred to are taken from the "Geological Handbook and Field Guide" to the Wren's Nest.

Locality 1 - Quarry Trench, Mons Hill.

Here the exposure is dipping at an angle of about 60° to the east and comprises beds of muddy shale, a thick band of crystalline limestone and then muddy clay. The entire Wenlock succession of the Silurian period can be found at the Wren's Nest. The 8.6-metre thick limestone band found here is known as the Upper Quarried Limestone (UQL) and dates from 418 Ma.

Locality 2 - The Nature Conservancy Council (NCC) cutting.

At this point, to the uninitiated eye, there is a track leading up hill with muddy walls. However, as Graham explained, what we were looking at was a walk back through time as we walked uphill. The NCC specially cut this E-W trench in 1977 to expose the complete succession below the UQL. As we walked up the trench Graham pointed out numerous features of interest, such as:

- Nodular beds made up of calcified sponges and the like,
- The sediment was derived from a low lying landmass to the east (St George's Land),
- There are 42 volcanic ash bands through the succession, some of which will have been as deep as 2 – 3 metres before compaction. Their effect on life must have been devastating. The clay is bentonite, i.e. weathered volcanic ash and contains crystals of zircon and lamprey type fish remains. Where did the volcanic ash come from? The latest theory is that the ash came from a volcano near to Cheltenham.
- There is a coral reef knoll, which unlike those on Wenlock Edge is only 10 m across. The environment was probably in a back lagoon protected by the Wenlock Edge Barrier Reef. The corals were smaller because in the quieter environment and they would have been more susceptible to choking from sediments coming off the land nearby.
- At the top of the hill, bottom of the succession, there is a 2nd band of limestone some 16 metres thick. Evidence of burrowing can be seen on the underside of some of the beds.
- Above this band of limestone there is a transition into muddy clay. In this clay can be found rugose corals and spiky trilobites.

Locality 3 - Nodular Member bedding plane.

At this point we were on the Western side of the anticline. The beds dip at a slightly shallower angle of approximately 50° and there are tension gashes caused during the Caledonian Orogeny folding at the end of the Silurian (approximately 370 Ma). These tension gashes have been infilled with calcite.

On some of the exposed surfaces there are trace fossil burrows of several different types (simple, networks and tripartite).

Locality 5 - The Observation platform and Fossil Trench.

From the observation platform there is an excellent view of the Ripple Beds. These are steeply inclined beds in which are

preserved trace fossils of seabed ripple structures. To the right of the fence there is a similar face that appears to be broken up by a band of limestone rubble whose bedding seems to cut across the face. This is a man-made feature that was caused when attempts were made to collapse the cave below; the end result was that part of the face collapsed inwards and the face above settled down onto the collapsed rubble.

We spent a while sorting for fossils amongst the rock scree at the base of the face. We found crinoid stems, brachiopods, bryozoans and corals. We did not find any trilobites.

Locality 9 - The Seven Sisters.

The top of the anticline would have been removed by surface quarrying to provide limestone for the iron smelting industry. By 1775, when the useful limestone had been removed, they started to quarry down following the dip of the rocks. Lumps of rock, weighing as much as two tons each, would have been hauled up the inclined face. By 1800 they had mined down to the extent of the daylight levels. The miners used black powder and tarred rope to blast the rock; this was a very hazardous operation. The Seven Sisters are the seven pillars of limestone that were left by the miners to support the roof of the anticline. Where the cool damp air from the caves meets the warmer air of the outside a misty microclimate is formed. 7 species of bat live in this environment.

By 1770 work had started on cutting canals through the bottom of the hill in order to remove the limestone more efficiently. Instead of 2-ton blocks on a cart they were eventually able to transport some 30 tons in a barge. At this point the price of limestone fell dramatically.

By this time geological science had started to develop and the miners made as much if not more by searching for fossils as they had previously made from mining the limestone. A large trade grew in the production of fake fossils.

In 1830 Roderick Murchison visited the mines and started work on a definitive book on the "Silurian System". Some 65% of the fossils used in this book were from the Wren's Nest. Roderick Murchison invited some 15 000 people to attend a lecture underground in the caverns of the Wren's Nest. The lecture was followed by a fireworks display and flares were set off to light up the enormous caverns. Murchison was dubbed "The King of Siluria" in a 224-line poem written at the time. Density logging was carried out for the first time in a coalmine in the Dudley area.

The range of hills formed by the Wren's Nest, Castle Hill Dudley, Turner's Hill (a dolerite intrusion) and the Clent Hills form the watershed of England. To the north the rivers flow into the North Sea, to the south they flow into the English and Bristol Channels.

Saltwells Nature Reserve.

In the afternoon we visited several sites of geological interest at the Saltwells Nature Reserve.

Locality 1

After a short walk along the canal to Brewin's Bridge we saw:

- Downton Castle (Early Devonian) deltaic sandstones. The sediment was derived from St George's Land.
- Devonian purple/green shales with very noticeable white mica flakes.
- There is a clearly visible unconformity (100 Ma missing) between Devonian shales and the Westphalian basal conglomerate on top. The Carboniferous limestone is absent.
- Mini coal seams.
- An axial fault can be seen near to the bridge and there is a dolerite dyke intrusion.

Locality 2

We walked down a tramway incline, which had previously been used to haul coal from the Doulton's Clay Pit below. At this point there is an exposure of the junction between the Upper Ludlow beds of calcareous siltstone and the Downton Castle sandstone. There is also a sandy development of the Ludlow Bone bed, which is very difficult to find; we didn't find it.

Locality 3 - Doulton's Clay Pit.

From the top of the pit there is an excellent viewing point. Doultons worked this pit from the 1870's to the late 1940's for the extraction of clay for sanitary ware manufacture.

Overlying the clay was a 36 feet "Thick Coal" seam. Still exposed is the "New Mine" coal seam. The whole exposure is a good example of a Coal Measures cyclothem. Siderite is also found here and was extracted for use in the manufacture of iron.

We all thanked Graham for a very informative day out; he has invited us back to visit other localities where he can talk about St George's Land and the formation of Pangea. I am sure that Janet will be taking him up on the offer.

Mike Fereday

PROPOSED FIELD TRIP PROGRAMME 2002

SUNDAY 14TH APRIL

Charnwood Forest, Leicestershire. A chance to study Pre-Cambrian rocks and search for Charnia Supergroup metazoan fossils.

This will be a joint meeting with the West Midlands Open University Geological Society.

MAY

A weekend field trip to the GOWER PENINSULAR, South Wales. Leader: Geraint Owen (University of Swansea). Sun, Sand, Sea and Sedimentary rocks. Folded, faulted, uplifted and eroded Devonian and Carboniferous sedimentary rocks.

Why not also bring the family along; there are lots of activities for non-geologists. Gower Heritage Centre, Stemberidge Mill, Wildfowl and Wetlands Trust and the National Botanical Gardens of Wales at Carmarthen.

SUNDAY 9TH JUNE

Ercall Quarry, Shropshire. Leader: Ian Stimpson (University of Keele).

Be prepared to do some active geology.

The opportunity to learn about Pre-Cambrian rocks (volcanic lavas, pink granophyre, steeply dipping quartz bedding, an unconformity, slickensides and ripple beds).

SUNDAY 21ST JULY

Clent Hills and St George's Land, West Midlands. Leader: Graham Worton (Keeper of Geology at Dudley Museum).

This is the next instalment of Graham's geological story of the West Midlands. It is hoped that we can arrange a pub lunch on this occasion for those who are interested.

"From the Carboniferous to Glacial Deposits".

SUNDAY 18TH OR 25TH AUGUST

Castleton Area in the Peak District, Derbyshire. Leader: Chris King (University of Keele).

"Problem Solving in the Peaks" using rocks in the Castleton area to teach about the Earth.

Be prepared to work!

SEPTEMBER

Cotton Dell, Oakamoor, Staffordshire.

A visit to this Staffs RIGS site to study Ken Rout's guide to its geology.

OCTOBER

We have some plans for a visit to the Malvern Hills, Worcestershire.

Watch this space as more detail becomes available but put the dates down in next year's diary as soon as you get one. The committee hope that many of you will support me in this my first year's programme as Field Trip Secretary. If you have ideas for any other field trip venues / leaders please let me have the details; my address is in the Bulletin.

Janet Fairclough Field Trip Secretary

Staffordshire RIGS Group

* next SRIGS committee meeting: Tuesday, 6 November 2001 at 7.30pm.

at the Staffs. Wildlife Trust offices, Coultts House, Sandon. Contact Sue Lawley at the SWT for details ☎ 01889 508534 or contact SRIGS Chairman, Ken Rout ☎ 01785 662291

NSGGA - Next Committee Meeting

Thursday 15 November at 7.00pm in room CBA1.077, Chancellor's Building, Education Department, Keele University

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Executive Committee (honorary):

Dr. Colin Exley; Terry Jones; David Thompson; Ted Watkin.

Executive Committee (elected):

Mike Fereday; Chris King; Phil Pye; John Reynolds; Ken Rout; John Winchester.

Executive Committee (co-opted):

In addition a representative from the Staffs. University Geol. Soc. and the Keele Geol. Soc. is invited to attend committee

ROCKWATCH

meetings co-ordinator: **Mike Fereday**

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Why not visit the NSGGA web pages: www.esci.keele.ac.uk/nsgga

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