



The Black Country Geological Society

NEWSLETTER NO. 134

APRIL 1999

The Society does not provide personal accident cover for members or visitors on field trips. You are strongly advised to take out your own personal accident insurance to the level you feel appropriate. Schools and other bodies should arrange their own insurance as a matter of course.

Leaders provide their services on a purely voluntary basis and may not be professionally qualified in this capacity.

The Society does not provide hard hats for use of members or visitors at field meetings. It is your responsibility to provide your own hard hat and other safety equipment (such as safety boots and goggles/glasses) and to use it when you feel it is necessary or when a site owner makes it a condition of entry.

Hammering is seldom necessary. It is the responsibility of the hammerer to ensure that other people are at a safe distance before doing so.

FUTURE PROGRAMME

There are a number of changes of date and meetings in this newsletter so please check all dates carefully.

Lecture meetings are held in the Banquet Room (Dudley Suite) at the Ward Arms Hotel, Birmingham Road. Phone (01384) 458070. 7.30 p.m. for 8 o'clock start.

SUNDAY 18th APRIL 1999 An introduction to Black Country Geology. Part 1: The first 100 Million Years. Leaders: Graham Worton and Alan Cutler. Meet at 9.45am. at the crest of Darbys Hill Road, Rowley Regis (NGR SO 966 895) where commanding views of the surrounding country will set the scene. We will then move to the Wrens Nest National Nature Reserve to see some classic exposures of the Silurian Dudley Limestone (Much Wenlock Limestone formation) and introduce World Heritage. Lunch will be taken at the Dry Dock Pub, Windmill End, Netherton (NGR SO 953 881) where refreshments will be available (and toilets). The afternoon session will be a visit to Saltwells Nature Reserve (SO 936875) to see Upper Silurian/ Devonian Strata and the Basal Coal Measure Succession. If time allows the afternoon will finish in a local Quarry to view other Carboniferous exposures.

SATURDAY 8th MAY 1999. Please note changes in day and date.

Field Meeting to Crewe studying the Mercia Mudstone Group, Northwich Halite and other mudstone formations overlain by Pleistocene strata. Observation of salt subsidence features such as terraces, flashes, linear valleys and brine springs. Visible engineering solutions for subsiding electrified railway lines, canals, bridges, tunnels and buildings. Crewe (O.S. Grid Ref: 725595) OS Sheet 118 Leader: Dr. John Stanley (Department of Earth Sciences, Keele University)

Meet at **10.30am**

Chairman
Alan Cutler B.Sc.,
M.C.A.M., Dip. M.,
M.C.I.M

Vice Chairman
G.J. Worton B.Sc.,
F.G.S., A.M. (Geol.),
M.I. Env. Sci.

Hon Treasurer
Joan Savage M.S.F.

Hon. Sec.
Ann Nicholds B.A.,
B. Phil. Ed. (V.I.)

Directions to meeting point:

North up the M6 to **J16**

1. **Left** into A500
2. **Right** onto A5020 at roundabout
3. **Left** (continuing on A5020) at roundabout (Note: that there is new construction on the next 2 mile stretch of the A5020 and another (straight-over) roundabout, traffic lights and a little bit of dual carriageway plus a new pub before reaching the roundabout adjacent to Crewe Railway Station referred next to as 5)
4. **Right** onto A534 (as if for Sandbach) at the roundabout near Crewe Station (there is a large Esso Station, then a fire station before the dual carriageway of the A534)
5. **Straight over** (A534) the next roundabout
6. **Straight over** (A534) again at the next roundabout and onto the Haslington by-pass. Not the widest of roads for a by-pass.
7. **Under two bridges** (roads or tracks over) then look for left turn
8. **Left into CLAY LANE**
9. Approx. 1 mile and a **left at the T junction** (an obvious left with most wheel wear on surface)
10. **Under railway bridge**
11. **Park in vicinity of Brook Farm overlooking railway to E**, (usually easily recognised by the birders who seem to be permanent fixtures) Meet at 10.30am. Anticipated to be at location for approx. 40 minutes. Possibility of pub stop for lunch at Warmingham, but bring pack lunch in case. This excursion has the unique quality of being possibly the only geological excursion on which you will see no rocks and may even escape with clean shoes. However, if it gets wet it can be advisable to bring suitable footwear. Cameras and binoculars will be useful - members must provide their own.

SUNDAY 16th MAY 1999 Working party at Hay Head SSSI. Meet in the lay-by a little to the north of the Three Crowns Pub on Sutton Road, Walsall (SP 051 982) at 10.0am.

SUNDAY 20 JUNE 1999 "Conservation - Protected Geological Sites within the Black Country" Leaders: Graham Worton & Alan Cutler - Black Country Geological Society. Meet at 10.30am at NGR SP051 982 in the lay by beside the Garden Centre on the Sutton Road, Walsall. We will take a short walk to the Hay Head SSSI to look at works to set up a geological trail and to discuss the difficulties and benefits of doing so. You are advised to bring a packed lunch although it is intended that we will stop at a local hostelry for an hour or so to get refreshments and get refreshed before moving onto the second site at about 1.30pm. The second site will be Pinfold Lane Quarry NGR SP053 962. Parking is a little restricted in the lanes here, so it may be that we leave some vehicles at the pub for this site. Pinfold Lane Quarry is a second tier site (i.e. not an SSSI but a SINC Site of Importance for Nature Conservation). Here we will look at a good site, of value in terms of amenity and education. We will discuss the process of funding, recording and selecting such sites and about the scope of works still needing to be done. The trip should finish between 2.00 and 3.00 pm. Hard hats are advised for Pinfold Lane Quarry as loose pebbles fall regularly from rock faces. Boots are recommended for the trek to Hay Head.

SUNDAY 25th JULY 1999 Family Meeting to Clearwell Caves, Cinderford, in the Forest of Dean.

Leader: Catherine Eales. Clearwell Caves are one of the largest iron ore mines in England and are still being worked by Free Miners of the Forest of Dean. The mine is open to the public to view the extensive maze of underground workings. Guided tours are provided with the tours lasting approximately 1½ hours. Good stout shoes or boots are recommended but not essential as the walkways are well used.

Meet at 11.00 am in carpark, with the group accessing the mine at approx. 11.30 am. Bring packed lunch, as the mines are in a beautiful area of the Forest of Dean, with picnic areas on the site. Further details regarding route plan to be in next newsletter or contact Catherine Eales or Ann Nicholds.

SATURDAY 11 SEPTEMBER 8.00 pm. Social Evening "The Lamp Tavern" (Batham's Ales) Dudley. Buffet Supper and Quiz. A chance for Society members (with non society companions if desired) to mingle and mix in a more informal manner than usual.

MONDAY 20th SEPTEMBER Lecture: "Catch a Falling Star- Meteors and Meteorites" by Barbara Russell (Society Member) Barbara is a past Chairman of the Wolverhampton Astronomical Society (affiliated to the British Astronomical Society and the Junior Astronomical Society).

Meteors and Meteorites form a very satisfying link between Barbara's two hobbies - Astronomy and Geology. Her interest in Astronomy goes back many years with Geology a comparatively new study.

Meteorites have an important role in the formation of the Solar System and the lecture will cover the history of meteors and theories of their origin, their composition and physical dimensions. Barbara will bring a few samples of meteoric material and if anyone has any other samples please bring them along.

MONDAY 25th OCTOBER "The Quaternary of the Isle of Man and the Northern Irish Sea Basin" by Dr. Roger Dackombe, Senior Lecturer in Environmental Science at Wolverhampton University. He has lectured to us on the Environmental Geology of Finland. His geological interests are Quaternary sediments and Applied Engineering Geology while his particular research interest is in the Isle of Man. He has researched glacial sediments and till sequences in the Isle of Man. He is Geological Consultant to the Manx Government for environmental questions and works with Liverpool University studying Manx archaeology in its geological context.

MONDAY 15th NOVEMBER "The Ice Age Fauna and Flora of Britain". by Dr Charles Turner of the Department of Earth Science at the Open University.

PROGRAMME 2000

MONDAY 31st JANUARY 2000 "Brains Trust" An opportunity for you to bring along your queries, specimens, problems etc. to our panel of experts. Written questions submitted in advance to the Secretary will be welcome. If anyone has a collection of particularly interesting transparencies bring them along and we can arrange to show them during the evening. Non-members welcome.

MONDAY 29th FEBRUARY 2000 "Canadian Appalachians - Ocean Closure and Links with the British Isles" by Dr John A. Winchester, Department of Earth Science, University of Keele

MONDAY 27th MARCH 2000 Dr Hugh Torrens, Society Member, "James Ryan of Dudley (1770 - 1847) and the problems of introducing new ideas (both scientific and technical) in British mines in the early nineteenth century."

MONDAY 24th APRIL 2000 Dr Frank Moseley, "Military Geology in the Middle East"

EDITORIAL

A record number of meetings are announced for the first time in this newsletter. You will see that your enthusiastic committee have been very busy organising an innovative programme. I hope you will read the programme carefully and give the events your support. Graham Hensman reports that he has finalised the lecture programme until the end of April 2000. Do take care not to turn up a year early for an announced lecture!

If you find a mistake in the newsletter I would appreciate if you would let me know. Paul Shilston found an error in our website address in the last edition. Entirely my fault, I would never spot such a mistake and am totally

dependent on the sharp eyes, intelligence and reporting of our readers.

All contributions to the newsletter are gratefully received, brief articles, puzzles, questions. And **please**, if you are willing to write an occasional report of a lecture or field meeting, do make yourself known to me. It's a happy newsletter editor who drives to a meeting unworried by the need to ask someone to write the report. Deadline for the next (June) edition is 12 May.

REPORTS

Annual General Meeting 1999

The twenty fourth annual general meeting of the society was held on Monday 8th March at the Ward Arms Hotel, Dudley. Forty five members were present and apologies for absence were received from Gerard Hawley, Chris Jowitt and Sue Fairclough. Members stood for a minute of silence in memory of Sheila Pitts and Dennis Wood. (It was not known at the time that sadly we also lost John Clifford in January).

Minutes of the 1998 AGM had been distributed, taken as read and approved, proposed by Douglas Warren and seconded by Hilary Giltrap.

A statement of accounts and Treasurer's report was presented by Joan Savage. The question of charity status was raised but has been found on previous investigation to be non viable for our purposes.

The Chairman's Annual Report was presented by Alan Cutler. Despite a very slight fall in membership numbers last year, the list of activities, conferences attended, projects undertaken, advice given and representation made by this Society was impressive. It is hoped that more members will offer their help this year. The adoption of the report was proposed by Graham Worton and seconded by Steve Hughes.

Officers and committee of the Society were re-elected, proposed by Douglas Warren and seconded by Barbara Russell. Chris Jowitt is unable to continue this year. We offer our heartfelt thanks for many years of sterling service, particularly at the Rock and Fossil Fair. Alf Cole was appointed in his place, proposed by Spencer Mather and seconded by Peter Smith. The Auditor's report by Martin Normanton was proposed by Kate Ashcroft and seconded by Catherine Eales. There being no other business the meeting closed at 8.17 pm. A.V.N.

Lecture Hunting the Snark: The Geology of the Northern Caledonides by Dr. Paul Smith. 25th January 1999

Dr Smith introduced his lecture with a slide of the Glencoul Thrust where the rocks have been thickened to a thickness of 1 km. by repetitions in a series of thrusts which extend from sea level to the high summit of Ben More Assynt. Against the might of Murchison and Sedgwick who, in 1835, believed that the succession here was conformable, Lapworth in 1881 had argued, correctly, for large scale thrusting to explain the geology of North Western Scotland. This argument is still alive with reference to East and North East Greenland and Dr Smith, Curator of the Lapworth Museum, gave an account of the geological evolution of this region during the Caledonian Orogeny. In North East Greenland thick skinned thrusts transported large chunks of basement up to 1 km thick, rucking up the sediments beneath them. Further west are thin skinned thrusts with multiple repetitions and further west still is undeformed basement with overlying Cambrian and Ordovician. This pattern is not unlike that in the West of Scotland.

East Greenland, further down the coast, where Dr Smith mapped last summer is an area of much greater complexity. The interpretation of the area is debated between the Danes (and the British) who argue the importance of crustal compression and thrusting and the Norwegian teams who concentrate on the effects of late orogenic crustal stretching and normal faulting. The Danes account for evidence of normal faulting as a late event when pushing ceases and large piles of rock collapse while the Norwegians deny the evidence of thrusting and talk instead solely of orogenic collapse. Dr Smith believes that the Norwegians put too much reliance on evidence from small scale folding and kinematic indicators which only record the last phase of movement.

In East Greenland Dr Smith spent three weeks logging 6½ km of Proterozoic sediments around Alpefjord to obtain a reference stratigraphy. There were thick units of siltstones with ripple laminations with thin sandstone bands together with tidally influenced quartzite units. There was no evidence of a base, granites being intruded between the sediments and the basement rocks. Despite being overlain by c. 18 km of sediment and being involved in the Caledonian Orogeny the metamorphic grade was relatively low. There were cross bedded sandstones. Ripple free

laminated muds and silts, thick bedded as though formed below the storm wave base by storm induced rip tides were mapped. Above the sandstones were outer shelf muds, rocks with flute casts and carbonate rocks with mud cracks and evaporite veins of anhydrite, clear evidence of shallow water.

Having carefully logged the section, helicopters were used to extend the survey: wave ripple units and sandstone units could be identified from a distance. Altogether 13 km thickness of vertical sediments were identified representing around 400 million years of sedimentation. How could such a basin be regulated to ensure the continuity of sedimentation? Paul suggested it was formed in the middle of a supercontinent above a hot spot which would thin the crust and lead to downwarping.

Then an attempt was made to map the sequence laterally 100 km northwards and a much thinner sequence was found somewhat eroded and unconformably overlain by the younger Lyell Land group. Also surveyed from a distance was the Petermann Bjerg group to the west where again the succession was thinner, with more sandstone and less ripple lamination indicating a more shoreward position. In the extreme west in the nunatak area, Proterozoic gneiss was overlain by sediments with burrows and limestones, comparable to the Durness area of Scotland and dating from late Precambrian or Cambrian. Above the Proterozoic are tillites in a mudstone matrix overlain by sandstones and carbonates so the great sedimentary thicknesses to the east are now reduced to a mere 100 metres.

The sudden changes in thicknesses of sediment from 18 km of sediments to a mere 100 metres can best be explained by telescoping of the basin during the Caledonian. When the compression stopped the sediment must have been subject to collapse and downfaulting explaining the Norwegian results.

Dr Smith gave a graphic account of the climatic, living and travel conditions involved in geological mapping in Greenland and the wild life to be found. The Greenland variation of the now familiar but long debated story of the Scottish Caledonides is much harder to interpret in the hostile environment of East Greenland and we are grateful to Paul for taking the time to help to unravel it for us.

Kate Ashcroft

Monday 8th March 1999. Lecture: The Failed Sellafield Deep Nuclear Waste Repository Project by Colin Knipe.

Colin Knipe has been a good friend of the BCGS for many years and has lectured to us on several occasions, so we were particularly glad to welcome him again to talk about the Sellafield Waste Disposal Enquiry in which he played a major role.

UK Nirex, the national nuclear waste disposal executive, had selected Sellafield as the most suitable site in Britain to dispose of nuclear waste but Cumbria County Council had refused planning permission. This Enquiry was to review the evidence and make a recommendation to the Secretary of State. Colin acted as Technical Assessor alongside a Planning Inspector during the 6-month long proceedings.

The material involved is Low Level and Intermediate Level nuclear waste which has a long decay period and must be safely stored for some 100 million years. Under international agreements it must be buried deep below ground, NOT on the surface or at sea, and each country must dispose of its own waste within its own frontiers.

The criteria for a suitable site are therefore :

- * it must be of adequate size.
- * its geology must be predictable.
- * it must have favourable hydrogeology with predictable ground water flows.
- * it must NOT have faults or short-circuit paths for ground water flow.
- * salt, clays or granites are suitable but any type of rock could be acceptable.
- * any geochemical characteristics must be favourable.
- * the rocks must have suitable mechanical characteristics.
- * there must be NO potential for mineral or other extraction at a later date when the actual site of the disposal has been forgotten.

These criteria can theoretically be met by several types of site including :

- * inland geological basins.
- * seaward dipping sediments.

- * BUSC - basement under sedimentary cover.
- * hard rocks in low relief areas.
- * small islands.

Nirex had selected 500- sites for consideration, reduced finally to around 12 for evaluation by MADA methods (multi attributable decision analysis) looking at aspects of Cost, Robustness, Environmental Impact, Safety etc., and the Sellafield site was chosen as their first choice.

Characteristics of the Sellafield site.

The stratigraphic sequence at the site is :

Sherwood Sandstone	(Triassic)
Brochram	(Lower Triassic)
Borrowdale volcanics	(Ordovician)

The Repository would be in the Borrowdale volcanics at 750 metres depth.

Nirex understood that the type and amount of groundwater flow around, and eventually into, the Repository was critical to its safety, so one aspect of their investigation was to drill boreholes at the site and study the flow, for example, by sucking a borehole dry then seeing how soon it refilled. They also repeated the tests using different lengths of borehole to study the strata at various depths.

While this indicated present-day conditions, the required time scale of 100 million years together with the fragmented nature of the rock with its many faults and likely earthquakes made a projection into the future highly problematical. Colin said that while much of Nirex's investigations proved to be flawed, in their defence he pointed out that in focusing on a 100M year time scale they were in completely new territory. Certainly no planning application had ever looked that far ahead, and they were for instance proposing to line the Repository Chamber with material to give the highly alkaline pH of 12, which was thought to give better protection when the inevitable groundwater incursion started attacking the Repository and its contents.

Other considerations.

A point that Nirex did not appear to have considered was the possibility of one or more ICE AGES during the period of storage. The last was only 10k years ago and even without global warming a cold period could be expected in the next 50k years or so (i.e. in the relatively near future). An ice age would cause a drop in sea level, so any leaching of radioactive groundwater would now be much nearer the surface, and could get into the drinking water chain for humans and animals.

Report of the Technical Assessor.

The Sellafield site was considered NOT to be suitable for several reasons :

- * the Borrowdale horizon was not uniform but had great geological complexity. It contained many faults, some known but probably many more not yet identified, and these could lead to unpredictable groundwater flow, and also to the great likelihood of earthquakes with consequent damage during the storage period.
- * its hydrogeology was similarly very complex and therefore unpredictable.
- * it did not conform to one of the preferred geological scenarios, in particular it was certainly NOT a BUSC site as the basement of Borrowdale Volcanics was not stable but was highly fragmented.
- * insufficient consideration had been given to the environmental impacts.

Selection of the Sellafield site for the Rock Characterisation Facility, which was in effect a trial run for the main Repository, and which was the main subject of the Enquiry, was considered unsatisfactory on several grounds :

- * poor design of the scheme.
- * there were many scientific uncertainties in the data presented.
- * inadequate consideration of environmental impacts.

Result of the Enquiry.

After receiving the reports of the Planning Inspector and the Technical Assessor, the Secretary of State, John Gummer, rejected the scheme in March 1997.

Final thoughts.

During questions & answers at the end Colin was asked for his opinion as to a suitable site. Speaking unofficially and off the record he offered two suggestions for serious consideration

- * drop the canisters into a deep ocean trench at a subduction zone. They would then disappear into the

aesthenosphere and not reappear for the requisite 100 M years.

* Cambridgeshire has the right BUSC configuration of sedimentary rocks above an old stable basement.

* * * * *

This was a most interesting and stimulating lecture and our thanks go to Colin for once again giving us a memorable evening.

Paul Shilston

CONSERVATION COLUMN

The days are growing longer and hopefully the seemingly incessant rain of the first three months of 1999 will go away for a while and give us a chance to do some spade work! The first formal working party at Hay Head is set for Sunday 16th May. See the programme list for details. There will be a short walk on public footpaths across farmland to the quarry so wellies, a single tool that is easily carried and bags of enthusiasm will be all that is required. The reconnaissance visit in February involved a small number of BCGS members and a wildlife officer from Walsall MBC. The group identified a number of areas of work to record and conserve the site and also to open up the special geology to the public in the form of a Geological Trail. So, if you fancy having a go at clearing up one of three sections of rock face, recording/photographing the site or locating the position of the Eastern Boundary Fault of the Coalfield by geophysics or augering, then come along and join us - we need your help!

Alan Cutler continues to represent the Society as a regional RIGS co-ordinator and through attendance at meetings of Ecorecord and Dudley's Agenda 21.

The proceedings of the first National RIGS conference held at Worcester College are available from the Geological Records Centre at Worcester College at a cost of £7.50 plus £2.00 postage. Cheques should be made payable to UK RIGS Conference. A second Conference entitled "Recording and Protecting Landscapes. The new RIGS structure" will be held at the College from 2nd to 4th September 1999. Further details can be obtained from Peter Oliver at the School of Environmental Science and Land Management, University College, Worcester, Henwick Grove, Worcester. Tel. 01905 855184 or on the internet. Website <http://www.worc.ac.uk/departs/envman/RIGS/index.html>

In January the BCGS was one of only two amateur conservation groups to participate in a meeting of English Nature in Peterborough to discuss a new initiative in geological site conservation. The strategy is called "Environmental Capital" and is exploring a means of assessing the relative value of all aspects of a local environment on scales from the international to the neighbourhood. This is an attempt to acknowledge the value of second tier sites (i.e. not the best or the only one of its kind, but perhaps the most accessible for schools, or the one of value to the local community because it combines many interests). I hope and believe that BCGS made a contribution by relating our experiences of working in local communities and in the practical conservation of second tier sites.

I am sorry that I have no news of Dudley MBC's World Heritage Bid.

Don't miss Dudley Museum's Jurassic Sea Dragons exhibition which has been described by the professionals as the best ever exhibition of Jurassic fossils that Britain has staged. I have been fortunate to catch a glimpse of a small portion of the fossils that are being assembled from collections around the country that have never been seen before, and I can confirm that they are breathtaking. Full compliments to Colin Reid and his team yet again.

Until next time

Graham Worton

NEWS IN BRIEF

Welcome to new members:

Jo and Tony Copson of Stourbridge

Robert Duncan of Dudley

Emma Marshall of Pedmore, Stourbridge

Geological Association Guide No. 61 Geology of the Western Front. This guide places the battles of the Great War in their geological and geomorphological context. Why was some ground more waterlogged than others? Why was

mining underground easier in some areas than others? Cost £10 members £13 non-members. Can be obtained from Geologists' Association Office, Burlington House, Picadilly, London, W1V 9AG

Ordnance Survey Offers. Buy two Landranger Maps and get half price accommodation at over 180 hotels in the UK.
Siteplan When you are extending your home or carrying out small building projects you need detailed mapping of your property or site to send to the planners. OS's Siteplan pack provides you with six copies of your project site, plus a guide to planning application procedures. £25 for six copies. Tel 08456 05 05 05

Look out for path guides, trail guides, street atlases, cycle tours among the lesser known publications of the O.S. For further information use the Customer information help line Tel 08456 05 05 05

"Earth Alert" Geologists' Association Festival of Geology 26 -30 May 2000 at the Brighton Conference Centre. Register before 30th November and save money. Remember paid up BCGS members are affiliated and get reduced prices.

University of Bristol Study Tours

Pompeii and Herculaneum 7 -14 May 1999 £675.00 Leader: Tom Barklem

Geology of the Island of Mull 26 June -2 July Tuition £120.00 Leader Dr Peter Hardy

Geology of Cyprus 12 - 26 September £995.00 Leader: Dr Peter Hardy

Geology in North Pembrokeshire 1 - 3 October Tuition £60.00 Leader Dr Peter Hardy

Bookings and enquiries to Sandra Powell, Programme Office, 8-10 Berkeley Square, Bristol, BS8 1HH
Tel. 0117 928 7153

A number of members attended the recent Midlands meeting of the Open University Geology Society at Birmingham University. The four contrasting lectures were excellent and BCGS members were delighted to be invited.

Sue Fairclough moved, on the 25th March, from the Queen Elizabeth Hospital to Hillcrest Rehabilitation Unit which lies within the grounds of Moseley Hall Hospital. She is making good progress and working very hard to regain movement. We take delight in the good news which is now reaching us.

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