NEWSLETTER No. 175
February 2006

The Black Country Geological Society

The Society provides limited personal accident cover for members attending meetings or field trips. Details can be obtained from the Secretary. Non-members attending society field trips are 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.

In this edition:

FUTURE PROGRAMME

Lecture meetings are held at Dudley Museum, St James's Road, Dudley. Phone (01384 815575)
7.30 for 8 o' clock start unless stated otherwise.

SATURDAY 18TH MARCH 2006 *(Field visit)*

Alan Cutler: Barrow Hill and the Dudley Volcano

Meet at the Vicarage Lane Car Park, **10.30 am.**

MONDAY 27TH MARCH 2006 *(Indoor Meeting and Society AGM)*

Annual General Meeting followed by a lecture from Peter Floyd, University of Keele:

"The K/T Boundary Mass Extinction Event"

The Agenda for the AGM appears at the end of this Newsletter. The AGM will **start at 7.30 pm.**

The K/T Boundary Event has been a topic for discussion amongst geologists for some time now, with various alternative theories as to the mechanisms that could have led to it. We are indebted to Peter for coming to talk to us on the subject.

MONDAY 24TH APRIL 2006 *(Indoor Meeting)*

Debate/Forum/Conversazione

"Evolution or Creationism/Intelligent Design – are they equivalent?"

SUNDAY 14th MAY 2006 *(Field visit)*

Martin Albut and Mike Williams: The Builth Wells Inlier

This replaces the periglacial visit that Andrew was to have led in May. Details of times and starting point will be available at the AGM and published in the April Newsletter.

SATURDAY 24th JUNE 2006 *(Field visit)*

Mike Williams: Possible coach trip to Big Pit, Blaenavon.

Big Pit stands on the eastern rim of the South Wales Coalfield, where coal outcrops on the hillsides. Iron Ore and limestone were also found here so it was natural for an ironworks to be founded at Blaenavon. The Ironworks were established in 1789 and the remains are now open for visitors and Blaenavon has been declared a World Heritage Site. It is now part of the National Mining Museum of Wales.

In order that our annual coach trip might go ahead, we need a minimum of 33 people to make the day viable. The cost will be in the region of £7 per head. The entrance to the museum is free but we are not yet sure of arrangements of a possible underground visit. It is also planned for the coach to pick up people in Wolverhampton, Walsall, Birmingham outskirts, Dudley and Stourbridge. **It is important that Mike gets expressions of interest by the AGM on March 27th or sooner if possible.** There is a slip at the end of this Newsletter that you are invited to use to inform Mike of your interest.

SATURDAY – SUNDAY 16TH – 17TH SEPTEMBER 2006

DUDLEY ROCK AND FOSSIL FAIR

This will follow the format of previous Rock and Fossil Fairs organised by Dudley. The society has booked the stall by the entrance as usual, and there will be opportunities for members to help in various ways during the event. More detailed information will appear in later newsletters.

EDITORIAL

ANDREW ROCHELLE; an obituary and appreciation.

It was with deep sadness that we heard of the sudden death of Andrew Rochelle, our Field Meetings' Secretary, early last month at the comparatively early age of 64. Andrew was a dedicated, innovative and energetic member of the B.C.G.S. Committee. He organised numerous field trips for society members, with special emphasis on the geomorphology of the glaciated Shropshire landscape which was his special interest. I shall miss the sometimes vigorous debates we had about the interpretation of glacial features - always dealt with patiently and courteously. Indeed after his retirement from the Ordnance Survey Department, he took his Masters Degree in Geomorphology at Wolverhampton University.

He had incredible luck with the weather on Field Trips, invariably having fine conditions to which many members can testify. Of course this was just luck, but as his professional work took him out of doors for much of the time, he is likely to have developed an intuitive feel for atmospheric conditions for the short term. How he could forecast six months ahead must remain a mystery!

Andrew loved landscape, and took an obvious delight in investigating and appreciating as many aspects of it as possible. His recent trips to St. Kilda and the Monach Islands, Hebrides, Switzerland in winter, Newfoundland and earlier Svalbard/Spitzbergen, revealed his fondness for travel to fascinating and often extreme environments. Above all his enthusiasm was so evident that it inspired all those around him to greater efforts and emphasized the immense fascination and importance of geology to us all.

Since his untimely death, we have discovered that Andrew was a man of many parts, having many interests, all characterised by a desire to make a contribution to society. He participated in Meals on Wheels for the elderly, for example, and he also helped with the education of prisoners in jail whom he euphemistically called "Very naughty boys"!

Andrew's wife died a few years ago. He leaves behind a son and daughter. His funeral took place in Wellington Methodist Church, and Telford Crematorium in an informal manner - which was his wish, and was attended by many of our members. We knew him as a "big" man, and he has left an ache in our hearts. I will miss him very much.

Gordon Hensman

The Society will be making a donation to Andrew's favourite charity, and members wishing to make a contribution should give/send it to *Mike Williams* by the AGM. The donation will be made immediately after the AGM.
Bob Bucki has kindly offered to temporarily step in as our Field Secretary.

MEETINGS REPORTS

Monday 28th November 2005

MEMBERS' EVENING

The elements and Dudley Council gritting dept. conspired to ruin this evening – but they did not entirely succeed! I must, of course, defer to our noble Field Meeting Secretary in the matter of weather divination. The weather on the 28th could hardly have been worse. A belt of heavy snow stretching back north-eastwards into the centre of the North Sea, delivered 8.5cm of snow between about 12.30pm and 4.30pm. The inevitable result was a traffic gridlock which the council, by coincidence, had promised would never happen again, in the local paper that very day! The meeting was scheduled to start an hour earlier at 7.0pm and I had to be there at 6pm to receive our buffet. However, caught in the traffic my normally 5 minute journey took 1h 45mins. Arriving at 7.10 I found that the buffet had amazingly arrived on time. Congratulations to Jenny's Kitchen. We eventually had 17 members, trickling in at various times all with horror stories of travelling in the Black Country. My thanks to all who so stoically attended.

Despite all this we had some fascinating talks. *ANDREW ROCHELLE* described his trip to the volcanic St Kilda islands, the Monachs and Shiant Isles. St Kilda was inhabited until the 1930's when it was evacuated and repopulated in the 1950's by the RAF to develop a Radar station to track missiles amongst other things. This was the next station on from Tiree where yours truly was based. Their buildings now form a bit of a blot on the most beautiful landscapes on earth. However, we were reliably informed that St Kilda is home to the cheapest "booze" in the British Isles, as well as Troglodites troglodytes – the St Kilda Wren!

St Kilda is the largest of a remote group of islands all of which are Tertiary igneous rocks about 50 miles west of the Outer Hebrides. They date from the commencement of seafloor spreading, when the Atlantic started to form some 63ma. They are composed of eucrite, gabbros and dolerites. The north-east parts of St. Kilda – Conachair and Oiseval – are intrusive granophyre against basic gabbros to the west. The whole group lie near the periphery of a plutonic complex some 6 miles across, the central portion of which is no longer observable but may well have been centred midway between St Kilda and Boreray, 4 miles to the north-east.

The Monachs are located just west of North Uist and are very low lying, with fabulous white sand beaches. They are very likely to be submerged if sea levels continue to rise. In common with the rest of the Outer Hebrides, they have already suffered subsidence whilst the rest of Scotland rose up isostatically, when the ice sheet melted. The Shiants, about 5-6 miles south-east of Harris in the Minch, contain some of the best examples of columnar jointing in basalt, and rival the better known Fingal's Cave and the Giant's Causeway.

Andrew also reviewed the past year's field trips. They were all fascinating but space constraints only permit the following:

- 19th March. Glacial features around Cosford. As usual the weather was brilliant.
- 7th May. National Stone Museum near Cromford, Derbyshire, and Matlock Museum and mines.
- 22-23rd May. Parys Mount Mine, Anglesey. Led by Bob Duncan who kindly arranged for us to stop in West Bromwich Mountaineering Club Hut in Plas Gwynant.
- 18th June. River Stour longitudinal traverse from St. Kenelms Church to Cradley Forge.
- 16th July. Joint Meeting field day with Woolhope Group, to Wren's Nest and Dudley Canal Tunnels.
- 17th September. North Wales – Snowdonia, Slate Museum and Pump Storage HEP Power Station, Llanberis.
- 1ST October River Stour Part 2. Cradley Forge to Stourport. During this we found that the cast iron plaque commemorating the importance of the site and links to Dud Dudley was still at the bottom of the Mousesweet Brook – as it was last June when I informed Dudley Council. It now resides in my garden until the Council see fit to restore it.

Gordon Hensman

Monday 6th February 2006

CARBON SEQUESTRATION AND DISPOSAL.
Dr Christopher Rochelle of the B.G.S., Keyworth, Nottingham.

We have had two excellent reports on this meeting, and make no apologies for printing both of them.

We were very fortunate to have Dr. Christopher Rochelle from the Geological Survey to speak to us for the 4th time in the last few years, on a topic which is directly related to what both the Prime Minister and Chief Government Scientist have declared the most serious problem facing the country - anthropogenic forcing of global warming of the lower atmosphere by the emissions of greenhouse gases and consequent climate change.

Dr. Rochelle presented us with graphs showing the relationship between atmospheric CO_2 and lower atmosphere temperature. They illustrated how these two variables rose and fell together. More apparent were the graphs for the last few hundred years which showed a dramatic increase in CO_2 and temperature. The CO_2 levels are derived from air bubbles trapped in the ice of Antarctica and Greenland when that particular layer of ice was laid down - maybe hundreds of thousands of years ago.

Deep oceanic cores of sediment also reveal the CO_2 content within the minute shells of microscopic shelled creatures such as foraminifera and diatoms. Such a positive correlation between two variables is proof positive of the direct relationship between CO_2 in the air and air temperatures.

Dr. Rochelle explained how work has been going on for some years now, to prevent the release of CO_2 from oil wells into the atmosphere, by capturing it and pumping it down into spent oil wells, which rejuvenates the well by pushing up more oil which would otherwise be lost. At a certain critical depth - about 800m - the CO_2 gas becomes indistinguishable from liquid CO_2, and becomes locked up in the strata. This carbon capture is one of the ways we can mitigate the effects of global warming.

Newer and more efficient methods of power generation can produce a carbon saving of about 20%, and the use of low carbon fuels about 10%. However, carbon capture and disposal underground has a potential of 80%. In the USA, the Great Plains Synfuel Plant in North Dakota sends CO_2 330kms by pipeline to the Weyburn Oilfield in Canada to be pumped into oil wells which store the gas and push out more oil. BP are stripping the CO_2 from natural gas and re-injecting it into the Saharan Gasfields at In Salah. The Norwegian StatOil is injecting some 1 million tonnes of CO_2 each year into the Sleipner Oilfield in the North Sea. Great Britain has an abundance of underground storage areas under the North Sea in depleted oilfields and deep saline aquifers.

Dr. Rochelle later sent us some extra information about the House of Commons Science and Technology Committee report on "Meeting UK Energy and Climate Needs," It is generally in favour of adopting CO_2 storage. Copies of this report can be downloaded from the web via the following link: http.//www.publications.parliament.uk/pa/cm/cmsctech.htm

We were especially grateful to Christopher for talking to us so soon after the untimely and deeply sad death of his father in early January.

Gordon Hensman

Andrew's son Chris kindly gave this lecture to us on 6th February. This was an updated version of the lecture he gave in October 2001.

Climate Change background

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CO_2 occurs naturally in the atmosphere, and is a greenhouse gas which keeps the planet warm. Until the emergence of forest clearance and agriculture 10,000 years ago, atmospheric CO_2 levels correlated well with the cyclic occurrence of Ice-Ages during the Quaternary. However since the Industrial Revolution human emissions of CO_2 have soared. As CO_2 is relatively unreactive it remains a long time in the atmosphere, and the amount in the atmosphere has risen by 40% since 1850 causing global temperatures to rise one degree. This may not sound much, until you realise that a 2 degree rise is enough to start the irreversible melting of the Greenland ice sheet, raising sea level by 6.5 metres-- bye-bye most of Holland and Bangladesh, and quite a bit of South East England. If we were to continue on present trends and burn all available fossil fuels, a huge rise in sea level would mean that most of the world's major cities and large areas of the best agricultural land would have to be abandoned. This is in addition to the effects which we are already starting to see such as changing weather patterns, increased storms and drought, and acidification of the seas.

So we need to reduce CO_2 emissions drastically.

Strategies for stabilising atmospheric CO2 levels at a safe level

To have a good chance of avoiding the Greenland ice sheet melting, atmospheric CO_2 concentration needs to stabilise at a level not far above today's level. The scale of emission reduction required to achieve this is very large: in the order of a 70% cut in world emissions. This would most likely involve a 90% cut in emissions by the developed world while limiting the developing countries to very modest growth in emissions per head, so that by 2050 each country has the same allowed quota of emissions per head.

1. Burn less fossil fuel

The obvious way to reduce emissions is to burn less fossil fuel by:

a) Cut our energy use radically. More efficient use of energy has a major part to play, but will not be nearly enough on its own.

b) Substitute renewable for fossil energy. However the most plentiful forms of renewable energy, notably wind and solar, are intermittent,

c) Substitute nuclear energy for fossil energy. However nuclear has an unsolved waste problem, as well as a cost problem, particularly with decommissioning.

Even using all three of the above will not produce the required cuts in CO_2 emissions unless we also substantially curtail our way of life.

2. Capture the CO_2 emitted when burning fossil fuel

There is however a further option which is to continue to burn substantial amounts of fossil fuels, but prevent the resulting CO_2 from reaching the atmosphere.

There are three types of storage possible:

a) Use biomass such as trees to soak it up, but too much CO_2, not enough land for additional trees.

b) Store CO_2 on top of the ocean floor at cold depths as a liquid; this is illegal under current international law, and the risk of mixing into the ocean waters is unknown.

c) Long term underground storage of CO_2 in deep strata where it will not leak out at a significant rate. These are porous strata overlain by cap rock; some are depleted oil or methane stores, but most contain only water trapped in aquifers.

This is the only realistic CO_2 storage option.

Long term underground storage of CO_2

CO_2 can be separated from the exhaust gases of large point sources such as Power Stations, and pumped to storage strata under sea or land. This will raise the cost of electricity by about 2.5p per unit, so will be cheaper than many renewables. Most of the cost is in separating the CO_2 from the exhaust gases. Storage will be at depths where even at the higher temperatures the pressure turns the gas into a liquid, which is less likely to leak. The oil industry already has experience of pumping CO_2 down depleted oil wells, where as well as raising the pressure it dissolves in the oil making it less viscous and more oil can be recovered. BP has announced a plan to capture and store CO_2 from power stations in NE Scotland and in California. These projects are intended purely to reduce CO_2 emissions.

Will it stay in storage?

Currently methane (natural gas) is stored safely underground in the UK and many other countries. In the Norwegian sector of the North Sea CO_2 separated from natural gas has been pumped back into aquifers under carefully chosen strata a kilometre under the North Sea since 1996. Seismic monitoring shows that leakage to the surface is most unlikely within the next several hundred years. Naturally occurring CO_2 is trapped under geological strata in a number of places such as under the Viking Graben under the North Sea, where it has been for 50MY.

Is there enough storage?

Globally and in the UK there is enough accessible storage in old oil and gas fields for 40 years' of CO_2 emissions, and in deep aquifers for at least 200 years' emissions.

Implications for our energy systems

Since carbon capture and storage is only economically feasible from large point sources such as power stations, in the long run we will substitute electricity for other energy forms, for example by using electricity for heat and hot water, primarily using ground source heat pumps which are three times more efficient than ordinary electric heaters.

Conclusion

Underground storage of CO_2 is a safe and cost effective bridge to an eventual future powered entirely by renewable energy. If politicians around the world can comprehend the urgency of the problem of Climate Change and have the will to act, then Liverpool could remain above the waves.

Martin Normanton

BLACK COUNTRY FOSSILS

Here is an illustration of the coral *Halysites,* it is a specimen to be found in Dudley Museum's collection, and was originally collected from the Much Wenlock Limestone in Dudley.

Halysites is a *tabulate coral;* that is a group of corals that had no vertical septa and are always *compound.* Corals consist of tubes with the animal living on the top, if the tube has no vertical internal walls – *septa* – it cannot hold itself upright, and so must rest against another tube for support, hence the term compound.

Halysites has tubes, or *corallites* which link together to form a chain, hence the common name of *the chain coral.* The term for this type of linkage is *cateniform;* or as one text book* puts it, 'cateniform colonies have elongated corallites joined end to end in wandering palisades'. Tabulate corals are confined to Palaeozoic rocks, and Halysites is confined to a time from the Middle Ordovician to the Upper Silurian.

You may have noticed that the value of the illustration is lessened by the absence of a scale. I wish I could say that this was a deliberate mistake, but it is a pure error. The width of the above specimen is 3.5cm.

*Invertebrate Palaeontology and Evolution by E.N.K. Clarkson. Blackwell Science. ISBN 0-632-05238-4

Bill Groves

GEOBABBLE

BOULDERDASH!

No this isn't a spelling mistake but a request to members to let me, Alan Cutler, know the whereabouts of any glacial erratics in and around the Black Country. Erratics is the collective name coined in the 19th century for the enigmatic boulders, some extremely large, which occur in many places in the British Isles lying on or just below the ground surface and which are completely unrelated to the surrounding country rock.

Erratics, as BCGS members will know, are a form of glacial refuse dropped by receding glaciers during the various phases of the Ice Age, the Pleistocene period, spanning the last 1 million years or so. Occurrences of these boulders are random and varying in quantity, mineral composition and origin. They appear 'erratically' hence the name.

As part of the Black Country Geodiversity Action Plan, leaflets are planned, in which the Ice Age will be featured, and they would not be complete without some reference to erratics. What I would like is to be able to highlight some of the larger erratics or smaller ones in unusual locations for the benefit of potential visitors. During late Victorian times many local authorities made a feature of some of the more spectacular boulders by erecting them in public parks usually with a descriptive label. In fact W. Jerome Harrison, who was science demonstrator for the Birmingham schools board, described many of these in his admirable book *Text-Book of Geology* published in

1889. The erratics in Cannon Hill Park Birmingham, Walsall Arboretum and Bantock Park Wolverhampton were illustrated and pleasingly at least two of these are still in place.

The Compton area of Wolverhampton is a particularly rich hunting ground. Erratics feature in the grounds of Wightwick Manor and also in walls and as oddball kerbstones. A large boulder serves as a kerbstone just outside the entrance to the churchyard of St. Michael's in Church, Hill Road Tettenhall. An even bigger boulder, of gneiss, nestles amongst the gravestones a few yards further on. The Bowman's Harbour development at Wednesfield, with which Graham Worton was involved, unearthed a considerable variety, from glacial channels, and which are now arranged as a landscape feature, although unfortunately there is as yet no public access.

Erratics could in theory occur practically anywhere in the Black Country although the northern parts, Wolverhampton and Walsall, are the more likely to yield results. They can occur within the coalfield mainly in channels or watercourses (where these still exist) or as strewn boulders on the mainly Permo-Triassic country to the west or east of the boundary faults.

So members, please let me know via the Newsletter editor of any erratic boulders that you can find or are known to you, from parks, gardens, fields or wherever. It doesn't matter if you can't identify the rock type any information is worthwhile if only location name and street or grid ref. This will be a valuable exercise for its own sake but the more spectacular or interesting subjects could find their way into print as part of the efforts to widen public awareness and appreciation.

Go boulderdash!

Alan Cutler

CONTACT US

As ever we would love to hear your news and views so please put pen to paper or fingers to keyboard and give us your thoughts. Notices that appear in this Newsletter will remain in future editions until the date of the related meeting or event has passed. In order to include material in the April Newsletter, please send or give it to one of the Editorial Team by ***Monday 3rd April 2006***

EDITORIAL TEAM		
Hon. Secretary: Sarah Worton 158 Oakham Road Oldbury B69 1QQ Tel 01384 235946	Graham Worton Dudley Museum and Art Gallery 1 St James' Road Dudley DY1 1HU Tel 01384 815574 Or email: graham.worton@dudley.gov.uk	Bill Groves 23 Churchward Grove Wombourne Wolverhampton WV5 9HB Or email: bill.groves@dudley.gov.uk billgroves300@btinternet.com

BCGS Website now at www.bcgs.info

ANNUAL GENERAL MEETING 2006

Notice is hereby given of the **thirty-first Annual General Meeting** of the

BLACK COUNTRY GEOLOGICAL SOCIETY

To be held at Dudley Museum at 7.30pm Monday 27th March 2006

AGENDA

1. Apologies for absence
2. Minutes of the AGM held on 4th April 2005
3. Statement of accounts and Treasurer's report
4. Chairman's annual report
5. Election of officers and committee
   - a) chairman
   - b) vice chairman
   - c) treasurer
   - d) secretary
   - e) meetings secretary
   - f) field meetings secretary
   - g) three committee members
   - h) auditor
6. Any other business

Current Committee members:

Chairman:	Alf Cole	Vice-chairman:	Alan Cutler
Treasurer:	Mike Williams	Secretary:	Sarah Worton
Meetings:	Gordon Hensman	Field Meetings:	
Members:	Barbara Russell, Bob Bucki, Andrew Harrison.		
Auditor:	Martin Normanton		

All posts are honorary and available for re-election. Nominations may be made to the secretary or declared at the AGM.

SUBSCRIPTIONS 2006

Your next subscription was due on **1st January 2006**. Please help the society by ensuring all subscriptions are paid as soon as possible – thank you.

Please send your subscriptions to the treasurer:
Mike Williams, The Bungalow, Parkdale West, Wolverhampton, WV1 4TE

SUBSCRIPTION RATES:	**Individual**	£20	per annum
	'**Family'**	£25	per annum
	Full time student	£5	per annum
	Group/Company	£35	per annum

Please enclose the slip below ----------

NAME **ADDRESS**

Telephone:

Email Address (please print clearly):

I would like to receive my newsletter by email **YES/NO**

I/we enclose **£……..** for Individual / Family / Student / Group .membership (please circle) **Date**:

Cheques should be made payable to **'THE BLACK COUNTRY GEOLOGICAL SOCIETY'**

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PROPOSED COACH TRIP TO *BIG PIT, BLAENAVON*, SATURDAY 24TH JUNE

I/we are interested (provisionally) in coming on this trip at an approximate cost of £7.

Name(s)……..

Contact telephone number……

If it was possible to pick you up in one of the following localities, which one would you prefer (please circle)

Wolverhampton Walsall Birmingham (west outskirts) Dudley Stourbridge

Please hand this form to **Mike Williams** at the AGM or alternatively telephone him with your expression of interest on **01902 822505**