# The Black Country Geological Society

NEWSLETTER No. 47 - October, 1984:

Editorial: Earthquake.

Since Britain is not usually in the news for natural geological events, it is quite exciting to have one to report on. This issue includes at the back two pages of a report about the North Wales earthquake in July, which Roy Prigg obtained from the British Geological Survey.

The presence of some geological enthusiasts including your editor on a field trip to Portmadoc shortly beforehand had absolutely nothing to do with the event. However, another member, Peter Whitehead (2 Birches Rise, Willenhall, WV13 2DB) would greatly appreciate it if members who were in the Walsall area at the time would let him know about their experiences, to help with a survey.

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Forthcoming Meetings:

Monday October 15th - THE SARACEN'S HEAD, Stone St., Dudley. Talk by Dr. I. Fairchild "The Balmy Shores and Icy Wastes of the Precambrian."

Monday November 12th - ALLIED CENTRE. Informal meeting. Talk by Maitland Woods on borehole drilling.

Saturday November 17th - Borehold drilling - ON SITE.

Monday December 3rd - ALLIED CENTRE. Talk by Professor Hallam on mass fossil extinctions.

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Meetings are held at the ALLIED CENTRE, Green Man Entry, Tower Street, Dudley, behind the Malt Shovel pub or THE SARACEN'S HEAD close by in Stone Street. Indoor meetings commence at 8 p.m. with coffee and biscuits (no charge) from 7.15 p.m. Field meetings will commence from outside the Allied Centre unless otherwise arranged. Those who would like lifts, please contact Nigel Bradley.

Non-members welcome.

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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 insurance to the level which you feel appropriate. Schools and other bodies should arrange their own insurance as a matter of course.

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Programme 1984:

November 12th, Monday. Informal meeting at the Allied Centre. Talk by Maitland Woods on the methods of borehole drilling used to ascertain the geological structure and stability of a site affected by old mine workings.

November 17th, Saturday. Borehole drilling on site. Meet outside the Allied Centre, Tower Street, Dudley 9.30 a.m. Details of site will be explained on Monday 12th but a note will be left on the door for late arrivers who cannot make the meeting. This will be followed by a buffet-social at the Park Inn, George Street, Woodsetton at 1 p.m. Tickets are enclosed. Please make cheques payable to BCGS and send to Nigel Bradley or return tickets.

December 3rd, Monday. Talk by Professor A. Hallam at the Allied Centre. "Mass Extinctions in the Fossil Record." See description in last newsletter.

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Outline for 1985:

January 21st, Monday. "The Future of Coal." Talk by Mr. K. Vowles.

February 11th, Monday. "Planetary Geology." Talk by Dr. R.Maddison.

March 18th, Monday. AGM.

April 23rd, Sunday. field trip to Church Stretton led by Andrew Jenkinson.

May 13th, Monday. Informal meeting and talk on "The Himalayas" by N. Howard.

May 19th, Sunday. North Staffs. field trip, led by Don Steward.

June. Visit to Glebe Mine, Eyam, Derbyshire.

July 5th, Friday. Conversazione, to mark the tenth anniversary of the BCGS.

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Committee Date:
November 19th, 8pm, Park Inn.

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May 14th, 1984: Lecture by Dr. R. Ixer of Aston University. "The Origin of some British Mineral Deposits - Some Recent Thoughts." Economic geology is a rather hybrid study, and is one of the last fields of the non-specialist who needs a working knowledge of many branches of the subject. An important speciality within it is ore-petrology, the study of opaque minerals by transmitted and reflected light.
Since about 1960 new analytical methods have evolved. These include X-ray diffraction, the use of the electron microprobe, and the scanning electron microscope. The great increase in chemical data also has brought about new thoughts. Analysis can now be carried out even on fluid inclusions.
Many base metal ores occur in basic igneous rocks. Basic magma is not usually wet, and contains 90% basalt. The next 8% of magma crystallised is intermediate in composition, and the last 2% is quite acid. With this last granatic part are the elements incompatible with the crystal lattice of the previous minerals, and include the large and exotic ions in the last hydrothermal fluids. These pass through joints and give vein deposits with quartz. This original epigenetic theory has undergone modifications because of modern analytical methods, and examples were then given illustrated by slides.
Sandstone hosts were discussed in relation to copper, lead, zinc and iron. Pore space filling is important in hydrology. Iron can be analysed for magnetic reversals and magnetic dip, and used in borehole

stratigraphical correlation. Mineral overgrowths of quartz, feldspars, and some iron and titanium oxides can be analysed. Red Beds have been the subject of much study including the deposition of copper, uranium, and vanadium, and diagenesis is now believed to be associated with the precipitating out of minerals in cool water, especially where the elements are incompatible with silicates.
An example of mineralisation in the North Pennines limestones was thought in the 1950's to be compatible with igneous origin. In the 1960's after borehole location of granite, all Pennine mineralisation was thought to be granitic. But mineralisation is in the Lower Carboniferous, and the granite is too young to have produced it.
Fluids are compressed out of basins towards their edges. In the 1970's it was observed that the North Sea expelled connate brines to give mineralisation, but granites have minerals concentrically around them. Then Rare Earths in fluorides were studied, and yttrium was found to be from granites. In the North Pennines tetrahedrite is silver bearing. Minerals have preferred temperature ranges, usually below 150°C for sediments. Pyrrotite is used as a specific temperature marker. Bleached beds occur in other situations as well as near granite. The occurrence of some minerals together establishes a stability range. Askrigg Block at 110°C and Alston at 250°C are too warm for sedimentary processes.
Much work in the last 18 months has come from Open University geothermal power studies of Pennine and other granites which are still cooling. This suggests that in the Carboniferous, granites probably produced the heat and metals for mineralisation. Over the past 30 years, fashions in geological thoughts about mineralisation have proceeded from a presumed igneous origin, through sedimentary processes, and back to igneous.
As always, Dr. Ixer gave us a most enjoyable and informative evening, leavened with humour and some healthy intellectual spepticism.

Sheila Pitts:

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June 4th, 1984: Field trip to the Eastern Boundary Fault, South Staffs. Coalfield. Leader Peter Whitehead. The party met at the Long Horn public house, Sutton Road, Walsall. We followed the public footpath northwards, which makes a semicircular tour crossing this interesting area. The first part of the route runs alongside the Hayhead Quarries, which were worked during the industrial revolution for the Barr Limestone (elsewhere called the Woolhope Limestone) which is near the base of the Wenlock Series. Exposures are few and far between, but are enough to show the general north-westerly dip at about 9° typical of the Walsall Silurian inlier. Within the shales just above the limestone, several bentonite horizons occur, indicating Wenlock volcanicity. These can be used for correlating outcrops over a wide area.
The quarries end abruptly at the Eastern Boundary Fault, when the footpath crosses onto Upper Coal Measures. The change from limy to acid soil is obvious to botanists, but little else shows the fault, which has a throw of several hundred metres.
Following the Coal Measures, the party saw some evidence of old field pits, perhaps worked by farmers for the poor coals. In addition the presence of a large artificial-looking pond on the edge of Potter's Wood suggests further economic activity at some time in the past.
This area is a good example of how little detailed knowledge we have of the history of some parts of our area. The limeworks are well known in

Walsall, but other uses of geological materials seem poorly documented, and hold potential for research.

Peter Whitehead:

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Dudley Limestone Workings: Progress Report Three:

The last two months or so have been relatively quiet as far as investigatory and remedial measures underground are concerned, except for the civil engineering contract works being carried out by Thyssens for the construction of the new canal tunnel leading into Singing Cavern. It is anticipated that the works will be completed by the end of September. During the succeeding months the various interested Voluntary Organisations and Council Departments will be carrying out work to "recreate" for the benefit of visitors the conditions under which limestone was actually mined during the last century.

Above ground the last two months have seen considerable efforts being devoted to the preparation of contract documents for the trial infilling at the Dudley Sports Centre, using rock paste, and also the undertaking of a comprehensive review of all Dudley's known and suspected limestone workings. The available information regarding their structural condition and the various land uses lying within the influence of the workings are being brought together to provide the Dudley Council with a comprehensive picture of the prevailing situation, and make recommendations regarding priorities and programmes for future investigatory and remedial actions, having regard to the likely level of financial resources including the Derelict Land Grant Aid from Central Government.

It is anticipated that the report will be considered by the appropriate Committee of the Council during September, and that with possible modifications it will be adopted as the Council's policy and programme for onward transmission to the Secretary of State. In addition the document will of course be of considerable interest to those having direct and indirect interests in the problems associated with the abandoned limestone workings, and the developing situation since the 1983 reports were published.

Alan J.R. Evans:

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Congratulations to Graham Worton who gained a 2.1 degree from the University of Aston in Geological Sciences.

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Due to lack of response, the proposed trip to York will not run.

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Geological Courses and Classes:

1. University of Birmingham, Dept. of Extramural Studies. Apply to Miss G. Bartlett, Mason Croft, Church St., Stratford-on-Avon, CV37 6HP.

   Geology of the Dorset Coast (Swanage area): Fee £11. October 20-21st.

2. Origin of Mineral Deposits: Dr. R. Ixer. 20 meetings £18.00. Dept. of Geological Sciences, University of Birmingham. Tues. 7.30 p.m. October 2nd.

3. First Steps in Geology: R. J. Kennedy. 20 meetings. Thurs. 7.30 p.m. As above, 4th Oct.

4. Natural History of Rocks: D.J. Gobbett. Weds. 7.30 pm. October 3rd. As above.

5. York Museum: "A new look at Dinosaurs." Nov. 2nd. 10.30 a.m. - 5.30 p.m. No charge mentioned.

6. University of Durham: Dept. of Adult Education, 32 Old Elvet, Durham, DH1 3JB. Deposit £45. Total £270. Tenerife. Volcanic Geology and Flora.

7. University of London: Apply to Michael Bamlett, 26 Russel Square, London WC 1B 5DQ. Lower Greensand. At Rogate Field Centre, Nr. Peterfield W. Sussex.

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From the Papers:

"Old Mine Records Must go Public."
Most local papers covered the launch of a campaign by Dudley West M.P. John Blackburn, to set up a central archive on all underground mine workings in the Black Country.
Express & Star. 9.4.84.

"New Storm Looming on Quarries Merger." 3.5.84.
"1000 in Battle over Quarries." 23.5.84.
An application by Amey Roadstone to close Turner's Hill Road between Hailstone and Edwin Richard's quarries has brought a renewed wave of protests from local councillors and householders. They claim for nuisance from dust and noise for another thirty years. A.R.C. say the quarry merger will secure 200 jobs for fifteen years.

Birmingham Evening Mail: 7.8.84.

# Pit waste to seal cavern blighting homes

Thousands of tons of colliery waste are to be used to fill up the most dangerous of the 31 limestone mines which honeycomb the foundations of £152 million worth of property in the Black Country.

The shale, from Cannock's Littleton Colliery, is to be mixed into paste and injected into an enormous 30,000 cubic metre cavern undermining Dudley's sports ground.

The operation, claimed to be a world first, may be repeated on many of the old mines blighting the homes of 9,000 peple over a two-square mile area of Dudley, Walsall and Sandwell.

Work is due to start on the Castlefields mine — rated the highest risk of 31 limestone pits — in the New Year and last for three months.

## Under hospital

The mine also tunnels under the Black Country Museum, the A4123 Wolverhampton - Birmingham road, and Dudley Guest Hospital.

"This technique has never been tried before," a Department of the Environment spokesman said today.

● Meanwhile, the Department of Transport is hoping for a breakthrough in deadlocked talks which have delayed for more than a year attempts to evaluate a threat to a busy three mile stretch of M6 - on - stilts in the Black Country.

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Please forward cheque (payable to BCGS) or return tickets to Nigel Bradley, 11 Leicester Close, Warley, West Midlands, B67 5NJ. 021 429 8833.

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| Admission Ticket<br>BLACK COUNTRY GEOLOGICAL SOCIETY<br><br>BUFFET - SOCIAL<br><br>At The Park Inn, Woodsetton,<br>Saturday 17th November, 1.00 P.m.<br><br>£2.00. | Admission Ticket<br>BLACK COUNTRY GEOLOGICAL SOCIETY<br><br>BUFFET - SOCIAL<br><br>At The Park Inn, Woodsetton,<br>Saturday 17th November, 1.00 p.m.<br><br>£2.00. |

## B.C.G.S. CHRISTMAS CARDS

Three designs are available, each depicting a black & white illustration together with descriptive notes and greeting. Cards are approximately 8" x 6" printed on top-quality board.

Ref. A Seven Sisters, Wrens Nest (Pen & Ink treatment) (Stocks limited)

Ref. B British Association visit to Dudley Caverns 1849 - Murchison's address

Ref. C British Association visit to Thick Coal Openworks 1849 - contemporary print.

The price for a dozen cards including envelopes is £2=50.

Mixed dozens may also be obtained at the same price, but must be restricted to 6 each of two designs or 4 each of three designs.

Single cards may be purchased at 25pence each.

Discounts available for quantities of 60 or more; details on request.

The cards will be available at society meetings from September or by post from Alan Cutler, 21 Primrose Hill, Wordsley, Stourbridge, West Midlands.
Telephone: Brierley Hill 77865.

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## B.C.G.S. CHRISTMAS CARDS

### Order Form

Please send me ..... dozen cards, ref. .....

..... dozen cards, ref. .....

..... dozen cards, ref. .....

For mixed dozens, state required designs.

Name

Address

Cheque enclosed for £..... Please add 50p towards postage
(Payable to B.C.G.S.)

# NORTH WALES EARTHQUAKE OF 19 JULY 1984 - INITIAL OBSERVATIONS

## Introduction

An earthquake was strongly felt throughout Wales, western England and eastern Ireland at 07.56 BST on 19 July 1984. It caused minor damage to buildings in North Wales and Merseyside and was reported felt slightly in more distant places, including Scotland, eastern England, London and SW England. The preliminary epicentral parameters (determined using the seismograph network of the British Geological Survey and those of collaborating groups in Ireland and Norway) are given below, together with reports of the felt effects. These parameters will be refined as more data becomes available.

## Instrumentally-determined parameters

The earthquake occurred at 07.56:12 seconds BST on 19 July, 1984, in north-west Wales. The provisional epicentre is at grid reference 245 km East, 345 km North. This estimate will be refined as more data is received from seismograph stations of the BGS UK network (Figure 1). The magnitude was between 5 and 5.5 on the Richter scale.

BGS seismograph stations throughout Britain and in western Norway recorded the earthquake. Instruments in Ireland and Europe have also contributed data to the investigation.

A number of aftershocks were detected shortly after the main shock. The largest of these had a magnitude of 3.2 on the Richter scale which indicates that it released 1000 times less energy than the main shock. One aftershock has been felt at Penrhyndeudraeth, near Porthmadog.

We expect many aftershocks to occur in the epicentral area during the next few weeks or months. A number of these are likely to be felt but they should all be smaller than the main shock. The British Geological Survey has sent a team to the area to install a local monitoring network in order to study these aftershocks.

## Felt effects

Initial reports indicate a maximum intensity of at least VI on the Modified Mercalli or MSK scales. At this level of shaking the event is felt by most people and causes alarm. Weak plaster and masonry is cracked

and damage is caused in some brick buildings.

The earthquake was strongly felt from eastern Ireland to Leicestershire and from Bristol and S Wales to north Lancashire, Weak reports, particularly from upper floors in high-rise buildings, have been received from further afield including Glasgow, Grimsby, London and Plymouth.

In Gwynedd there was damage to chimneys and ornaments fell over in a number of localities. In Bangor stones were reported to be displaced from a wall. In Aberystwyth ornaments fell over. In Liverpool and Birkenhead a small number of chimney stacks were damaged and a house in Warrington was damaged. In Manchester, and throughout Lancashire, it was strongly felt but no reports of damage have been received. A picture fell off the wall in Barrow-in-Furness. Houses rattled and plants shook in Sheffield. It was strongly felt in Leicester and stock fell from shelves at a store in Coventry. Staff evacuated tall buildings in Bristol and Swansea. In Ireland the event caused much alarm but no damage on the east coast from Belfast to Waterford.

BGS are conducting a large-scale macroseismic survey to obtain further details of damage and felt effects. This will be achieved through questionnaires published in the Press and a field mission to the epicentral area.

Tectonic setting

There are several major geological faults passing through the epicentral area all trending WSW-ENE. These include the Berw, Dinorwic and Bala faults and the Lleyn Thrust. At this stage there is insufficient information to attribute the cause of the earthquake to a particular fault or geological structure.

Historical seismicity

Historically, this earthquake ranks with the largest experienced in Britain over the past 200 years. Comparable earthquakes occurred near the Dogger Bank in 1931 and near Colchester in 1884. Worldwide, such earthquakes are common with approximately 1000 events each year.

The largest earthquakes felt in the epicentral area since 1800 are:

27 July 1852: NW of Anglesey, felt throughout Wales, in W England, S Scotland and E Ireland.

19 July 1903: Caernarfon, felt most strongly in N Wales and as far as Kendal and Carmarthen, and slightly in Ireland.

Dec. 12th.1940. Offshore Lleyn . Since 1969,nine smaller earthquakes in NW Wales, the largest in Anglesey were 3.5 Richter.