



The
Black
Country
Geological
Society

NEWSLETTER NO. 145 February 2001

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

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.

WEDNESDAY 21st FEBRUARY 2001 Rockwatch Roadshow 10 - 4pm at Walsall Town Hall, Lichfield Street. To be held in the February half term, this would appear to be an important venture. Take the children or grandchildren back to the Jurassic with a range of activities: model dinosaur claws, Velociraptor skull, fossil identification, construction of a Jurassic forest and much more.

MONDAY 26th FEBRUARY 2001 Celebrity Lecture by Professor Richard A. Fortey of the Department of Palaeontology, The Natural History Museum, and Department of Zoology, Oxford University. This is organized by and to be held at Dudley Museum from 2:30pm to 5:00pm. If you wish to attend please contact Graham at the Museum (01384 815574) who will take bookings and give details about time. This is not a BCGS organized event but members are invited provided they give Graham notice. Professor Fortey will also sign copies of his book.

MONDAY 26th FEBRUARY 2001 "Quaternary Topics" Dr D. H. Keen, Department of Geography, Coventry University. (Professor Keen worked as a field mapper for BGS mapping the Quaternary deposits of the Channel Islands) Recent work on the raised beach sequences of the Eng. Chan. has allowed a revision of their ages, the climate at their formation, and shown how they may be related to the earliest human occupation of the British Isles and to episodes of glaciation. His talk will focus on the Channel Islands and coast of Normandy where much of the evidence is best seen but will also include examples from Brittany, Sussex, Hampshire, Dorset and Devon to indicate particular aspects of the age and environment of the beaches and associated deposits. Also the mechanism of formation of the beaches will show how raised beach "staircases" such as those of Sussex are produced by slow uplift, probably powered by erosion determined isostatic forces.

MONDAY 26th MARCH Annual General Meeting at 7.30 pm followed by "Bringing Dinosaurs to Life" John Martin, Managing Curator, Leicester City Museum. The use of pictures and specimens as interpretive media in exhibitions, and vertebrate palaeontology, especially the biomechanics of sauropod dinosaurs, coincide in his work and in his talk. As an illustrator and exhibit maker he is especially interested in how influential dinosaur art has been, and how most of it has been based on guess work.

The reconstructions of the early 19th century pioneers, such as Richard Owen (who invented dinosaurs), now look obviously wrong because they lacked complete specimens. John will

show how the guesswork to fill in the missing bits has as much to do with fashion, politics and artistic prejudice as with science. Finally, there is a balance between the artists who just copy and invent and fine, well-researched reconstructions.

THURSDAY 5th APRIL The Trilobites and their relatives: an international symposium. This event is being organised for Oxford University by Dudley Museum and will involve a fossil hunt at Wrens Nest, a visit to the Black Country Museum and caverns and socialising. BCGS members are welcome to attend, please contact Graham at the Museum on 01384 815574 for booking and further details.

SATURDAY 14th APRIL An introduction to Hay Head and Barr Beacon. Come and experience the newly opened Geological Trail at Hay Head. Leader Alf Cole (BCGS Member). Meet at 10.00am in a layby on B4151 Walsall to Sutton Coldfield road, between the Three Crowns Public House and the Three Crowns Garden Centre - about 3km from Walsall centre. (Contact Alf on 01922 634899 if you need more details).

MONDAY 23rd APRIL “A Walk across the Mid Atlantic Ridge: A geological Guide to Iceland” P F Regan, Division of Earth Sciences, University of Derby.

MONDAY 21st MAY “The Geology of Eastern Europe” Dr Jan Zalasiewicz, Department of Geology, University of Leicester. The lecture will tell of the current state of geology in Eastern Europe illustrated by snapshots of geological activities in Poland. In communist times many geologists were employed in both academic and applied fields. Many lost their jobs as a result of the transfer to democracy. The rest form a thriving community with greater links with western geologists.

Now much work is required in assessing and cleaning the environment damaged by smokestack industries, particularly in the industrial corridor in the SW, bordering the Czech Republic and in former East Germany. Also there is a more understanding of the problems in Polish geology, helped by international co-operation and access to modern analytical equipment. In the communist years a 1km borehole was drilled through high grade igneous/metamorphic rocks as well as sedimentary examples of extraordinary and delicate sedimentary/tectonic structures, relics of a Variscan accretionary prism in the Sudetan Mts.

SUNDAY 23rd JUNE A walk through time: an overview of the Malverns. Leader Dr Mike Bell (Cheltenham and Gloucester College of Higher Education.)

SUNDAY JULY Cresswell Crag, Nottingham. There is geological, archaeological, flora and fauna interest at this site. The Trust who runs the site is holding an Open Day. The leader will be the East Midlands Geological Society's magnesium limestone expert.

22nd & 23rd SEPTEMBER Dudley Rock and Fossil Fair 2001.

REPORTS

A comparison of the mass extinction events at the end of the Cretaceous~ Permian and Triassic periods.
Professor A. Hallam, School of Earth Sciences, University of Birmingham, 27th November 2000.

Although the American geologist T.D. Chamberlin was the first to propose, early in the last century, that major faunal changes through time which provided the basis for stratigraphic correlation were under the ultimate control of epeirogenic movements of the continents and ocean basins, it was his palaeontological compatriot Norman Newell who began the modern study of mass extinctions. In a series of articles in the 1960s, he proposed a strong relationship between marine mass extinctions and eustatic falls of sea level. Of six major events he recognized, five have become generally accepted as the “big five” mass extinctions at the end of the Ordovician, Permian, Triassic and Cretaceous, and in the late Devonian (Frasnian-Famennian boundary). The causal relationship that Newell proposed involved loss of habitat areas in epicontinental seas, where most at least of the benthic biota are thought to have lived. After the classic publication by Luis Alvarez and colleagues reporting on the discovery of an iridium anomaly at the K-T boundary, interest became concentrated on bolide impact as a causal factor in mass extinctions in general. Insofar as attention was paid to marine regression, a certain amount of scepticism was expressed, for example at the rarity of extinctions that could be related to the evident glacio-eustatic regressions of the Tertiary. In 1989 Hallam confirmed Newell's regression hypothesis for at least some major and minor extinction events, but pointed out that the spread of anoxic bottom waters associated with marine transgression, sometimes but not always

preceded by a major regression, was also a potent extinction mechanism, presumably because of the severe reduction in viable habitat area.

In their 1997 book, Hall and Wignall observed that, apart from the K-T boundary, evidence of impact as a causal mechanism for mass extinctions was either weak or non-existent, and even for the K-T boundary there was evidence for major sea-level change that required further evaluation. Of the phenomena apparently related to sea-level change, anoxia associated with eustatic rise seemed to be more important than regression as a correlate of mass extinctions. A review of the relevant literature coupled with personal fieldwork in some cases suggests that nearly all marine mass extinctions are associated with rapid, probably global, sea-level fluctuations, of which regressive-transgressive couplets are the most common; the most notable exception are the Frasnian-Famennian and end-Palaeocene events. There is no general pattern as to where the extinction occurs within the regression-transgressive cycle. Thus, the late Ordovician extinctions were a double event associated with both regression and transgression. Permian extinctions associated with regression were considerably separated in time from those at the end of the period associated with transgression. The end-Triassic extinctions are more obviously associated with regression than the subsequent transgression and accords well with Newell's hypothesis, but in other respects his hypothesis is not well supported as a model of general validity. Thus, two of his type examples, the late Devonian and end Permian, are now regarded as transgression/sea-level highstand phenomena. While the strong temporal correlation with latest Cretaceous regression and mass extinction holds, it is proving difficult to disentangle the environmental effects of regression from those due to late Maastrichtian climatic cooling and end Cretaceous bolide impact. The most frequent association of marine mass extinctions is with transgression and the spread of anoxic waters into epicontinental seas. This applies to one of the two events near the end of the early Cambrian, the second phase of the end Ordovician, the Frasnian-Famennian boundary, the end Devonian, end Permian, early Toarcian and Cenomanian-Turonian boundary. Most workers favour anoxia as the direct kill mechanism.

With regard to the ultimate cause of the sea-level changes, the evidence of tillites provides support for a glacioeustatic origin for the end-Ordovician and end-Devonian events, with sea-level fall being promoted by the build-up of Gondwana ice caps and rise by subsequent melting. For all the other events, however, such evidence is lacking and in some cases is strongly against the kind of climate that would promote the growth of substantial ice-caps. The end-triassic event is especially interesting. The rate of sea-level change across the Triassic-Jurassic boundary in Europe appears to be too rapid to be accounted for by changing oceanic ridge-volume tectono-eustasy. Relatively sharp uplift followed quickly by subsidence can be related to the initiation of breakup of Pangaea by tensional activity recorded on both sides of the present central sector of the Atlantic ocean. This event is associated with extensive flood basalt extrusion and shallow intrusions of dykes and sills, an association that has been related to the existence of a mantle plume. Submarine volcanicity on a massive scale appears to be implicated in the likeliest scenario for the Cenomanian-Turonian boundary, with concomitant phenomena including sea-level rise, a possible runaway greenhouse effect and increased oceanic anoxia. Such a scenario could also be applicable to the end-Permian event, thereby helping to explain substantial extinctions on land as well as in the sea.

Professor Hallam illustrated his analysis with slides of his field work. In a Pakistan gorge he found evidence of marine regression and transgression but it proved to be within the Permian not at the boundary. In China rocks showed a most striking example of transgression as evidenced by changes from Permian limestones and shales to shaley Triassic beds of a deep basin facies, bottom beds inimical to life, many of which have been subducted and lost. Further evidence for regression followed by transgression at the end of the Triassic came from the Alps and the Canadian Arctic.

The K-T boundary records a complex story of bolide impact, very great changes of sea level and marked cooling. Events at these extinctions are complex. At the end of the Permian many plants and large reptiles were lost and there is evidence of changing temperatures, plants of cooler climates, expulsion of CO₂ into the atmosphere and a greenhouse effect. With global warming the ocean waters can hold less oxygen. Can subocean lavas give rise to runaway greenhouse effects?

Professor A. Hallam (corrected)

The Society is grateful to Professor Hallam for providing us with yet another thought provoking lecture.

Members Evening. Mini lectures

Monday 4th December 2000

This was a very interesting and social event which enabled people to get together in groups to discuss in more detail the topics raised. First to participate was Robin Beton with an illustrated talk on a fossilised tree from the Island of Mull, first discovered in 1819. It can only be reached at low tide, is 40ft high and 5ft across. It is a conifer engulfed and burnt by plateau lavas.

Andrew Rochelle provided an introduction to his research into patterned ground in Shropshire. The area was photographed by the Ordnance Survey in bright sunshine at midday in July 1990, and under dry conditions the crop of winter wheat was stressed and showed up periglacial patterned ground. The areas of patterned ground have been mapped, recorded to data base and related to slope, aspect, height AMSL, soil type and geology. The phenomena have

been classified in terms of shape, size and form and relationships established between land-use and the display of patterns. Wedges, involutions, frost modified sediment and till have been recorded and observed. The series of polygons in the sands and gravels required further investigation and as the area had 3 metre trenches dug across it for the burial of turkey offal, Andrew, undeterred both by the smell of rotting turkey offal and the danger of trench collapse) was able to study the patterns in three dimensions. Provisional results reveal that patterned ground sites appear on regular and gentle slopes with an average gradient of 0.98 degrees, only one site displaying a significantly steeper slope of 3.5 degrees. The average long axis of patterns was 11.78m and short axis 10.9 metres. It appears that the greater the particle size the smaller the pattern. All the subsoil analysed and associated with patterns proved to have been deposited in an environment of fluctuating energy levels. The polygons have an average of 5 sides and are produced by convection in the sands under periglacial conditions. The features are orientated downslope. Andrew also showed photos of pingoes and buildings subject to freeze thaw in the McKenzie delta and Dawson City.

Alf Cole returned us to the Black Country with his talk on Hay Head and Pinfold Lane Quarry and the conservation work done and in progress. He reminded us of the details to be seen in the quarry: the pebbles, from a southerly direction brought by the Budleighensis river in a gorge through a series of grabens as described by Wills, the mud clasts deposited by flash floods and the ventifacts abraded by desert winds.

Paul Shilston took us to the Whin Sill of Northumberland, demonstrating the features it has produced such as the escarpment along which runs the Roman Wall, the headlands at Bamburgh and sea stacks of the Fame Islands.

Kate Ashcroft used a slide brought by Peter Parkes to remind members of the extensive conservation work done by Peter Parkes, Cohn Mitchell and many others in the early days of the Society.

The meeting was rounded off by mince pies and those who were absent missed a very entertaining event.

EDITORIAL

The coming year is one of much geological promise. Do get your diaries out and list the many events newly announced in this newsletter. There is such a lot to look forward to, beginning with Richard Fortey's lecture in late February. There is also a lot of hard work to be done, notably the Saltwells clean up and above all the Rock and Fossil Fair which has always benefited by enormous support from society members. Fm sure Graham is banking on our continued cooperation. Don't forget the AGM and its earlier start. So much effort goes into the programme and the organisation of special events. We are fortunate in Dudley to have such a high profile that people are willing to make the journey here. Please keep up your support!

CONSERVATION COLUMN

Saltwells Clean up to occur in February 2001

The society is co-ordinating a cleanup of the canalside cutting at the Saltwells Local Nature Reserve towards the end of this month. You may recall that a large working party of BCGS members did this once before, about 10 years ago, in order to bring back to the former glory the important features at the site including the unconformity and a basalt intrusion. Much vegetation has grown back in this time and the exposures definitely are in need of a facelift. This has been enabled by English Natures groundwork's fund that will pay for the hire of a specialist contractor to carry out the difficult works on the high slopes and the disposal of the waste generated by the work. It is to be done in association with the Dudley Canal Trust and with the approval of British Waterways Board.

We need to put together a working party of volunteers to help with the clearance of the scrub along the towpath itself. The works will commence on either the third or fourth weekend of February when the logistics are finally sorted out. If you think that you could help and would like to be involved then please give me a call at Dudley Museum (Tel 01384 8 15575). This is an exciting project that will provide an important enhancement of a very important educational and scientific site.

BLACK COUNTRY SITES No 9: BARROW HILL. PENSNETT

Barrow Hill ([National Grid Reference SO 39155 28965](#)) is a prominent landmark with a parish church and summit with a large shining steel cross formed of hard, dark igneous (volcanic and intrusive) rocks. These are of an olivine basalt type emplaced as magma burst its way into the older sedimentary rocks about 300 million years ago during the Upper Carboniferous Period (Westphalian D). The basaltic rocks exposed here are very hard and resistant to wear and tear. As a result of these properties, large quarries have been excavated in the hill to extract the stone for use as a road aggregate. These abandoned quarries have many excellent rockfaces of high scientific, educational and aesthetic value. Features that can be seen here include;

- *altered blocks of the country rock which were ripped off the walls of the area being intruded by the molten mass and adsorbed into the melt where they were partially 'cooked' and altered (these now exist as highly altered xenoliths (formerly blocks of red silty clay from the surrounding Etruria Marl) with networks of calcite veining)*
- *Features related to the slow cooling and solidification of the molten rock; in particular sets of fractures and shrinkage cracks that give rise to weakly developed columnar jointing.*
- *Weathering features including a full soil profile from turf to solid rock; and classic rounded 'onion weathering' (exfoliation)*
- *The western quarry has carbonaceous materials and apparent volcanic ejecta / agglomerates which strongly implies that this is the volcano ~ 'site for the ash beds' at the associated SINC at Tansey Green which contain 3d preserved primitive conifers in life position.*

The site was subject to significant scientific debate between the 1920's and 1940's concerning the interpretation of the hill as being of volcanic origin, intrusive origin or both and many papers have been published on the site and its surroundings. This site is also important in terms of the interpretation of the unique volcanic history of the region as a whole. It is of particular value when considered together with exposures in other local sites such as Rowley basalt / dolerite quarries~ The Clee Hills basalt quarries and basalt outcrops in other parts of the region

All of these features and human endeavours conspire to make this a particularly important geological site. Since abandonment much vegetation has grown in the quarries and some clearance, quarry footpath establishment and signage would significantly enhance the general amenity of the site.

The quarry is best approached from the car park adjacent to the church or from the footpath from Victoria Lane. Follow the footpath from the car park to the north west, and as you emerge from the trees you will see the first of the old quarries on the right and their spoil heaps on the left. If you follow the footpath to the left here it leads downwards and westwards to the quarries adjacent to the church which are much overgrown and have deep water in their base. Great care should be taken in this area and good exposures can be seen looking across the quarry from the track without any need to go down into the quarry itself

