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Circular 515



YORKSHIRE GEOLOGICAL SOCIETY

President: Professor Pete Rawson

CURRENT POSTGRADUATE RESEARCH

*View from the western rift
shoulder of the northern
Ethiopian rift looking from
around 3500m elevation
into the rift valley, more
than 2000m below.*

*The Blue Nile Falls in
Ethiopia - near its source in
the Highlands of Ethiopia
near Lake Tana.*



SPEAKERS: IAN BASTOW, KAREN DRUERY,
AARON W. HUNTER & GRAHAM THOMPSON

14.00 to 16.30 SATURDAY 21ST FEBRUARY 2004

LECTURE THEATRE CG85, SCIENCE LABORATORIES
STOCKTON ROAD, DURHAM UNIVERSITY, DURHAM

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YGS 2004

CURRENT POSTGRADUATE RESEARCH

- 14.00 - 14.05 **Introduction and Society Announcements**
Professor Pete Rawson UCL, London
- 14.05 - 14.10 **Northumbrian Rocks and Landscape - Relaunch**
Dr. Colin Scrutton
- 14.10 - 14.30 **The EAGLE Broadband Experiment - a seismological investigation of the transition from continental rifting to incipient oceanic spreading**
Ian Bastow (University of Leeds)
- 14.30 - 14.55 **Geochemical, mineralogical and geomorphological controls on metal uptake by grass and thistle in the Swale catchment, Yorkshire, UK**
Karen Druery (Research School of Earth Sciences, UCL and Birkbeck)
- 14.55 - 15.30 **Tea and Coffee**
- 15.30 - 15.55 **Environmental control on echinoderm trophic structure and functional morphology in the Jurassic and Cretaceous marginal marine environments of England.**
Aaron W. Hunter (Research School of Earth Sciences, UCL and Birkbeck)
- 15.55 - 16.20 **Understanding contact diagenesis: a look at hot lava/sediment contacts in NW Namibia.**
Graham Thompson (Department of Earth Sciences, University of Durham)
- 16.20 - 16.30 **Closing Remarks**

SUBSCRIPTION RENEWALS REMINDER

Subscriptions are due on January 1st and remain as last year i.e.

ORDINARY	£30.00	ASSOCIATES	£10.00
OVER 65	£20.00	STUDENTS	£12.00

If our current records show that we expect you to renew by cheque, then CH will appear on the top line of the address label of this Circular. Please send a cheque for the relevant amount (made payable to YGS) to Mrs S. Rogers, 4 Middledyke Lane, Cottingham HU16 4NH.

Please Note: A £2.00 surcharge is made on all late subscriptions. This applies whether wholly or partially outstanding at the end of February.

If you pay by direct debit you need take no further action. If you pay by standing order PLEASE check with your bank that it is for the correct amount.

The Society would like to thank the Paper Co Leeds for sponsoring the paper for this publication and therefore allowing it to be produced in colour at no extra cost to the YGS.

THE EAGLE BROADBAND EXPERIMENT - A SEISMOLOGICAL INVESTIGATION OF THE TRANSITION FROM CONTINENTAL RIFTING TO INCIPIENT OCEANIC SPREADING

Ian Bastow, Graham Stuart, J-Michael Kendall (The University of Leeds, UK), Cynthia Ebinger (Royal Holloway College, University of London, UK) and Atalay Ayele (Geophysical Observatory, University of Addis Ababa, Ethiopia)

The three dimensional structure of oceanic rifts is primarily controlled by the supply of magma (eg. Phipps-Morgan & Chen 1993) whereas that of continental rifts is controlled by the spatial distribution of large border faults (eg. Hayward & Ebinger 1996). Thus, magmatic processes increase in their dominance as we move from the continental rifting environment of the East African Rift to the oceanic settings of the Red Sea and Gulf of Aden to the North of Ethiopia.

The EAGLE - the Ethiopia Afar Geoscientific Lithospheric Experiment - has been a major recent UK/US/Ethiopian initiative to investigate when and how transition between these two end member processes occurs. I will summarise the progress to date of the EAGLE broadband experiment. A brief overview of the challenges associated with carrying out fieldwork in Ethiopia will be followed by an introduction to seismic tomography and a summary of results to date.

We image a slow velocity anomaly in the upper mantle beneath the rift valley itself which is surprisingly offset from the location of the most recent magmatic activity at the surface. In the south of the study area where the rift is continental in nature we image a tabular slow velocity anomaly beneath the rift valley. As we progress towards Afar in the north, the slow velocity anomaly broadens at depth as the system becomes less constrained by lithospheric structure and asthenospheric processes begin to dominate. A good understanding of pre-existing lithospheric structure is important in understanding plume lithosphere interactions in Ethiopia.

GEOCHEMICAL, MINERALOGICAL AND GEOMORPHOLOGICAL CONTROLS ON METAL UPTAKE BY GRASS AND THISTLE IN THE SWALE CATCHMENT, YORKSHIRE, UK

Karen Druery

Research School of Earth Sciences, UCL and Birkbeck

It is increasingly evident that heavy metal pollution from historic mining can have long-term environmental effects. The River Swale catchment, Yorkshire Dales, north-east England, was extensively mined for Pb and Zn during the 18th and 19th centuries, resulting in considerable contamination of the fluvial environment. This research evaluates the degree of persisting contamination, and its effect upon plants. Soil total (aqua regia-extractable) Pb, Zn and Cd concentrations are elevated within all of the six study reaches, with Pb ranging from 101 to 4016 mg/kg, Zn 166 to 1427 mg/kg and Cd 0.7 to 2.7 mg/kg in September 2002. Soil pH was found to be neutral to alkaline (pH 6.98 - 7.83), with a trend towards decreasing pH downstream. Phase 1 Habitat surveys carried out in six geomorphologically distinct reaches along the River Swale, identified plant communities of neutral and improved grassland and semi-natural woodland. Areas of poor plant growth and chlorosis have also been observed, especially close to mining sites, and bank erosion and channel movement also affects floodplain vegetation. Samples of plants common to all six study reaches (grass: *Cirsium palustre*, thistle: *C. acaulon* and *Cynosurus cristatus*) show varying degrees of metal concentration, and are comparable with EDTA- soil Pb, Zn and Cd. Mineralogical work has also shown that the amount of metal taken up by the thistles may be limited by the formation of insoluble metal phosphate minerals around the roots. Addition of phosphate to promote further formation of these minerals may therefore be considered as a mechanism for managing metal pollution on these floodplains. These data will all be integrated and used to predict the geochemical, mineralogical and geomorphological controls on metal uptake by plants in Swaledale.

ENVIRONMENTAL CONTROL ON ECHINODERM TROPHIC STRUCTURE AND FUNCTIONAL MORPHOLOGY IN THE JURASSIC AND CRETACEOUS MARGINAL MARINE ENVIRONMENTS OF ENGLAND

Aaron W. Hunter

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Research into the palaeobiology of fossil Isocrinid crinoids by Mitchell & Langner (1995) using bulk sampled fragmentary remains, from the Lower Cretaceous Red Chalk of Yorkshire and Humberside, shows a strong environmental control on the distribution of crinoids related to their functional morphology; research has not yet been extended beyond the Albian.

New research using bulk sampling of Middle Jurassic (Bathonian) sediments of England, representing a greater range of marine environments, from open shelf to lagoonal, has yielded numerous crinoid ossicles and other echinoderm material. Extensive work on exceptionally preserved Middle Jurassic crinoids from Northern Switzerland and the British Lower Jurassic has enabled the identification of these crinoid ossicles to generic level.

Results show that colonisation patterns of crinoids are comparable to those observed in the Lower Cretaceous, which are strongly influenced by facies type. This allows the community structure of the crinoids to be clearly defined in ecosystems delineated by substrate type and degree of marine connection. Distinct crinoid communities with specific functional morphologies can be identified based on the presence and absence of generic indicators. Continuing research has shown that this environmental control can be observed in other echinoderm groups.

These trends have subsequently been followed into the uppermost Cretaceous chalks of northern Europe, where even the most subtle changes in substrata affect the trophic structure of echinoderm communities.

UNDERSTANDING CONTACT DIAGENESIS: A LOOK AT HOT LAVA / SEDIMENT CONTACTS IN NW NAMIBIA

Graham Thompson

Department of Earth Sciences, University of Durham, Durham DH1 3LE, UK

Email: g.a.thompson@durham.ac.uk

The Etendeka basalts of NW Namibia make up a small part of the larger Paraná-Etendeka Flood Basalt Province that was erupted between ~130-120 Ma at the initial break-up of the Gondwana Super-continent. The basal Tafelkop Member of the Etendeka basalt displays a unique interaction with the aeolian deposits on which it rests. Systematic burial of the aeolian erg by pahoehoe lava flows has preserved the original features in many of the dunes and simultaneous deposition and lava flooding has led to the incorporation of a number of isolated dunes as interlayers between lava flows.

Research is focussed on the diagenetic effects, both direct and indirect, of the emplacement of the lava and associated sills and dykes, on the aeolian sands. Specific interests include: the compartmentalisation of basins by sills / dykes / lavas and how this affects fluid flow paths; can large intrusions / igneous events trigger the movement of hot fluids through the basin; and is the dramatic reduction in porosity and permeability along hot contacts the result of the igneous bodies alone or do they need ground water present?

The project takes a multi-dimensional approach to answer these questions and utilises large-scale field interpretations and small-scale petrographic analysis along with geochemical data. A number of case studies have been selected to address the main problems outlined previously and, from these, detailed sample sets and field data-sets have been generated. The main aim of the research is to identify the mechanisms by which the sediment has been diagenetically altered and to assess the degree of involvement of igneous material and igneous-derived fluids. Detailed petrographic analysis has been carried out on thin sections taken from each sample. The purpose of this is to identify the type and nature of pore-filling cement that has been implicated in the creation of an indurated zone seen at hot lava / sediment contacts. This data has been supported with cold stage CL data. Digital image analysis techniques using images of thin sections have been developed to quantify the degree of porosity change occurring in the sediments, and counter-intuitively, the relative increase / decrease in pore-filling cement. Geochemical analysis including Sr/Rb radiogenic isotope studies and ^{13}C and ^{18}O stable isotope data will help to assess the origin and

temperatures involved in the cement precipitation. The sediments from NW Namibia provide examples of intrusion and lava contacts in an essentially dry basin setting. This allows the investigation of the direct effect of the igneous bodies on the sediments without massive overprinting due to further diagenesis caused by ground water. In the few areas where later groundwater fluids have entered the basin we are able to successfully compare the direct with indirect effects of the igneous rocks.

PRESIDENT'S WORD

The General Meeting at Leeds on 24 January on the 'Evolution of Early Vertebrates' was a particularly interesting one which brought out in dramatic form how much further back in time some of the vertebrate groups must have evolved compared with what we thought only 10 years ago. Now we look forward to seeing new postgraduate research presented at Durham and hope that as many of you as possible will come along to support the next generation of research workers.

The printing and use of colour in our Circular has been modified following members' comments and we hope that you will now find it clearer and more attractively presented. At its Leeds meeting, Council agreed to use the same colour for the whole session, then go onto a different colour for the next (2005) session. More importantly, we hope to increase the breadth of information provided and improve communication, though this will be a gradual process. In the meantime, you will see elsewhere in this circular that we are also initiating a members' competition to provide 12 photographs for a proposed YGS Calendar, and we look forward to being flooded with entries!

Council also agreed that in future we will have an attendance book at each general meeting, which will be passed around during the lecture for completion. It will simply ask for your name and address, and for you to tick whether you are a member or not. We would be grateful for your active support, as complete entries will give us a much better idea of where we draw our audiences from, while at the same time serving as a safety check-list in an emergency. It does not mean that we or anyone else will be bombarding you with unsolicited mail!

We are pressing ahead with developing our Forward Plan and have had very useful comments from a handful of members about ways in which we could make the Society more attractive to potential members. But we would be delighted to hear from more of you.

PRESIDENT'S WORD *continued*

On a sadder note, we have been very sorry to learn of the recent deaths of two of the Society's great stalwarts, Professor Leslie Moore and Doctor Dorothy Rayner, both of who were Honorary Members who had served as President. Their obituaries will be published in the next issue of our Proceedings.

Finally, the second edition of Northumbrian Rocks and Landscape will be available for sale shortly: our next Circular will include further details and an order form.

GENERAL NOTICES

AGM DATE CHANGE

Please note. Because of problems arranging suitable venues for both the AGM and Annual Dinner 2004, the date has had to be moved to 4th December 2004. The AGM was advertised in the Annual Programme 2004 as the 11th December 2004.

STAY IN TOUCH DURING THE SUMMER

Do you want to know what your society is up to during the summer? Well now you have the chance. If you register your interest, Council will keep you up to date with the YGS through an occasional e-mail circular. All you have to do is send an e-mail to info@tcpleeds.com with YGS as the subject and your e-mail address as the message and YGS information will be forwarded to you. If you do not have an e-mail facility send your name and address to the circular editor (address on the back of the circular) and he will forward you a copy by snail mail.

REVIEW

William Smith map of 1815 (unfolded)
Published by BGS, price £15.00 + p & p.

The BGS inform us that this is the first time that all six sheets of William Smith's 'Delineation of the Strata of England and Wales with part of Scotland' has been produced in one sheet. The joins between the original sheets have been digitally removed to provide an attractive and interesting map of Smith's 1815 work.

This is a well-produced and impressive map at 1330 x 930 mm in size and would interest anyone with even a passing interest in historical geology. Besides William Smith's geological interpretation of Britain's strata the map includes cities, major roads, mines and

areas flooded by the sea. Colours are matched to those used originally and a scale of 10 miles to the inch is used, which is $1/2$ scale of the original map.

I would recommend this publication to anyone interested in William Smith's work or with £15.00 to spare; its size may even save you redecorating a wall. A copy can be obtained from www.bgs.ac.uk/bookshop/product.cfm?id=WS1815 or from the BGS, Keyworth, Nottingham, NG12 5GG.

KDP.

ADVERTISEMENT

Free to a good home and on a first come first served basis. Richard son of Dr. Joe Capewell would be grateful if a good home(s) could be found for his father's journals: A). Proceedings of the Geol Association; B). Journal of the Geol Soc, London; C). Proceedings of the Yorkshire Geological Society, with all 3 being long runs from 1930 to the present. Please contact at home address at 15 Edge Hill Court, Edge Hill, London, SW19 4LL. Tel home 020 8739 0166, work 01392 373962 and email rcapewell@perennial.org.uk.

CALENDAR COMPETITION

As you will have noted in the President's Word, the YGS Council has decided to produce a YGS limited edition calendar for 2005 (in conjunction with The City Press Leeds Ltd) and you have a chance to be a star player in the project. The theme of the calendar will be 'Geology of Northern England' and we need photographs on this theme for the calendar. So, get your cameras out and get snapping, the 12 winning photographs will feature in the calendar and highly commended photographs will take pride of place on the front cover of the circular as and when appropriate.

You must have copyright on all photographs entered. The City Press Leeds Ltd have kindly volunteered to supply the origination and help with the production at a very competitive price, therefore we will be able to handle photographs in most formats including high resolution jpegs (600dpi minimum), though tiff or eps files reproduce better in most cases. Prints and transparencies can also be accepted but if you want them returned please enclose a SAE. Photographs etc should be sent to the circular editor (address on the back of the circular), files (up to 3.5Mb) should be sent to info@tcpleeds.com and be clearly marked Calendar Competition. Closing date is Friday 1st October 2004. It is estimated that a minimum of 50 calendars will need to be produced to make this project viable, so look out for the order form coming soon and get your order in quickly as the calendars will be on a first come first served basis.

MEETINGS OF CORRESPONDING SOCIETIES

Contact society representatives for the latest information.

CRAVEN & PENDLE GEOLOGICAL SOCIETY

Yvonne James. Tel: 01282 813 772 or www.cpgs.org.uk

Ice Cold in Adel:

Urban and suburban glaciology in and around Leeds

Speaker: Jon Barber, B.Sc. (Hons), University of Leeds

Friday 20th February

The Volcanic Geology of the Aeolian Islands

Speaker: Alison Quarterman, B.Sc. (Hons), Huddersfield Geology Group

Friday 19th March

CUMBERLAND GEOLOGICAL SOCIETY

Nigel Courtman. Tel: 01229 861 478 or www.cumberland-geol-soc.org.uk

West Cumbrian rocks and vernacular architecture

Speaker: David Grech. The Friends Meeting House, Kirkgate, Cockermouth

25th February

“Graptolites and the dating of the Skiddaw Group Rocks”

Dr Adrian Rushton, Natural History Museum, London

Conference Centre, Newton Rigg Campus, Penrith

17th March

EAST MIDLANDS GEOLOGICAL SOCIETY

John Wolf e-mail sec@cmgs.org.uk or www.emgs.org.uk

President’s Evening celebrating 40 years of the EMGS

Start: 6.30pm

Saturday 7th February

Earthquakes in the English Midlands

Speaker: Dr Brian Baptie, British Geological Survey, Edinburgh.

Start: 6.30pm

Saturday 13th March

HUDDERSFIELD GEOLOGY GROUP

Julie Earnshaw (Secretary). Telephone: 01484 311 662 or e-mail: earniehome@ntlworld.com

HULL GEOLOGICAL SOCIETY

Mike Horne. Tel: 01482 346 784 (after 7.30 pm)

or e-mail: m.horne@hull.ac.uk or www.go.to/hullgeolsoc

Early Cretaceous Events: from Eastern England to Argentina

Speaker: Professor Peter Rawson, University College London

Thursday 12th February

AGM & “The Speeton Plesiosaur Revisited”

Speaker: Will Watts, Dinosaur Coast Project

Thursday 25th March

LANCASHIRE GROUP OF THE GEOLOGISTS’ ASSOCIATION

Norman Catlow. Tel: 01772 727 577 or e-mail: norman@catlow4736.freemove.co.uk

LEEDS GEOLOGICAL ASSOCIATION - 130th ANNIVERSARY PROGRAMME 2004

Anthea Brigstocke (General Secretary). Telephone: 01904 626 013.

E-mail: abrighstocke@hotmail.com or www.leedsgeolassoc.freemove.co.uk

Presentations by Students in the School of Earth Sciences

3rd/4th Year Students, School of Earth Sciences, University of Leeds

19th February

LEEDS GEOLOGICAL ASSOCIATION continued

Mantle Plumes do not Exist 18th March
 Speaker: Dr Gillian Foulger, Dept of Earth Sciences, University of Durham

LEICESTER LITERARY & PHILOSOPHICAL SOCIETY

Chairman: Andrew Swift. Tel: 0116 252 3646. as48Ele.ac.uk

Members Evening Wednesday 11th February
 New Walk Museum, Leicester

The Marine and Flying Reptiles of the Mesozoic Saturday 21st February
 Saturday School (whole day) 9.30am - 5.00pm. Vaughn College, Leicester

From Greenhouse to Icehouse from Forests to Frost Wednesday 25th February
 Using Fossil Plants to track Climate Change in Antarctica
 Speaker: Dr Jane Francis, Department of Earth Sciences, University of Leeds

MANCHESTER GEOLOGICAL ASSOCIATION

Jane Michael. Tel: 0161 366 0595, e-mail: jammyjane@aol.com or www.mangeolassoc.org.uk

Annual General Meeting & Presidential Address. Start: 7.00pm Wednesday 11th February
 High-Grade Metamorphism and Granite Genesis in the Crust
 Speaker: Dr Giles Droop, University of Manchester

Afternoon Seminar - Geology, Carbon and Climate Saturday 20th March
 Speaker: Dr Fred Broadhurst, University of Manchester &
 Dr Joe McQuaker, University of Manchester

NORTH EASTERN GEOLOGICAL SOCIETY

Frank Trowbridge. Tel: 01642 582 786, e-mail: frank.trowbridge@care4free.net
 or www.northeast-geolsoc.50megs.com

The Lower & Middle Palaeolithic as seen by a Quaternary Geologist 20th February
 Speaker: Dr David Bridgland

AGM 19th March

WESTMORLAND GEOLOGICAL SOCIETY

Mrs P. M. Wilson. Tel: 01539 533 198 or www.wgso.fsnet.co.uk

AGM & Presidential Address: start 7.45pm 18th February
 Speaker: Dr Stuart K. Monro

The Semail Ophiolite of the United Arab Emirates 24th March
 Tales of deserts, camels and lost oceans
 Speaker: Dr Emrys R. Phillips

YORKSHIRE REGIONAL GROUP OF THE GEOLOGICAL SOCIETY

Isla Smail. Tel: 0113 242 8498, e-mail: isla.smail@arup.com

Surface Instability due to Coal Mining 25th February
 Speaker: Philip Naylor, South Yorkshire Mining Advisory Service
 University of Sheffield. Start 6.30 for 7.00pm

SUBMISSION OF PAPERS

Manuscripts for publication in the Proceedings should be submitted to *The Editors, Proceedings of the Yorkshire Geological Society, Geological Society Publishing House, Unit 7, Brassmill Lane Enterprise Centre, Brassmill Lane, BATH, BA1 3JN*. Typescripts should be prepared using the updated instructions for authors given on the inside back cover of the latest issue (Volume 54 Part 4, November 2003).

Publication of manuscripts may be expected in the next, or next but one part, following acceptance. As a result of the change in publishing arrangements the proceedings will be abstracted and/or indexed in, *GeoArchive, GeoRef, Geobase, Geological Abstracts and Mineralogical Abstracts, Research Alert and Science Citation Index Expanded (SCIE)*.

COPY FOR CIRCULAR

Copy deadline for Circular 516 is the 11th February. The next indoor meeting will be held on the 20th March 2004 at BGS, Keyworth, Nottingham. Sir Kingsley Dunham Meeting: Geological Hazards and Disasters. Speakers: Nick Riley (BGS) and Phil Allen (Aberdeen).

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