

Geoscientist

The Fellowship magazine of The Geological Society of London | www.geolsoc.org.uk | Volume 21 No 9 | October 2011

ANTHROPOCENE

A time whose time has come
around at last?

SENSITIVE FILLING

European petrol
stations surveyed

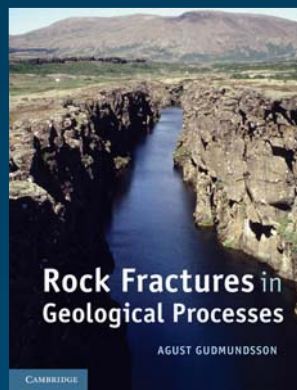
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A detailed oil painting of Charles Lyell, a prominent geologist. He is shown from the chest up, in profile, looking towards the left. He has dark, wavy hair and a full, dark beard. He is wearing a dark, high-collared coat over a white shirt and a blue and white striped cravat. The background is a dark, muted green.

CHARLES LYELL

Richard Fortey on breaking the Deep Time barrier

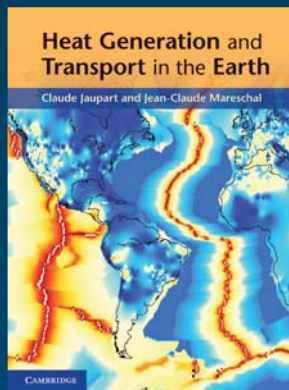
New and forthcoming Earth Science titles from Cambridge



Rock Fractures in Geological Processes

Agust Gudmundsson, *Royal Holloway, University of London*
Hardback
9780521863926
May 2011
£45.00

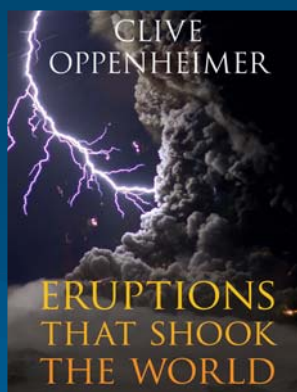
Explores and explains fracture processes and fluid transport in the crust, with numerous worked examples, step-by-step calculations and practice exercises.



Heat Generation and Transport in the Earth

Claude Jaupart, *Université Paris-Diderot Institut de Physique du Globe de Paris*,
Jean-Claude Mareschal, *Université du Québec, Montréal*
Hardback 9780521894883
November 2010 £45.00

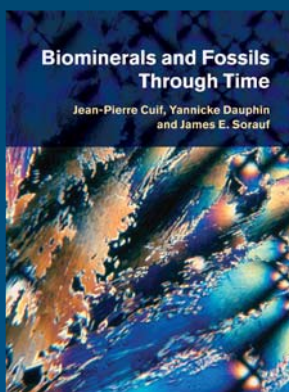
An up-to-date treatise on heat transport processes for advanced students and researchers of geophysics, geodynamics and magmatic processes.



Eruptions that Shook the World

Clive Oppenheimer, *University of Cambridge*
Hardback
9780521641128
June 2011
£19.99

A spellbinding exploration of the history's greatest volcanic events and their impacts on the history of humankind.



Biominerals and Fossils Through Time

Jean-Pierre Cuif, *Université de Paris-Sud II, Orsay*, Yannicke Dauphin, *Université de Paris VI (Pierre et Marie Curie)*, James E. Sorauf, *State University of New York, Binghamton*
Hardback 9780521874731
December 2010 £75.00

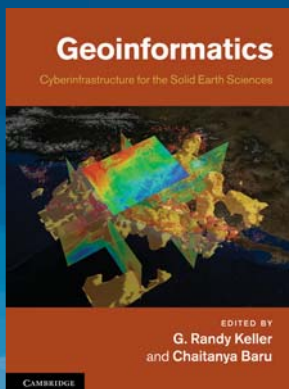
Fossil biomineralization in a geologic framework for researchers in paleontology, Earth history, sedimentology and geochemistry.



Ichnology: Organism-Substrate Interactions in Space and Time

Luis Buatois, *University of Saskatchewan, Canada*,
M. Gabriela Mángano, *University of Saskatchewan, Canada*
Hardback 9780521855556
June 2011 £50.00

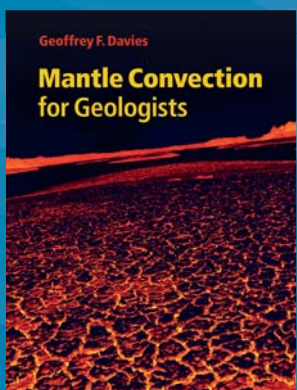
A comprehensive study of trace fossils through geologic time for paleontologists, sedimentologists and petroleum geoscientists.



Geoinformatics: Cyberinfrastructure for the Solid Earth Sciences

G. Randy Keller, *University of Oklahoma*, Chaitanya Baru, *University of California, San Diego*
Hardback
9780521897150
May 2011 £80.00

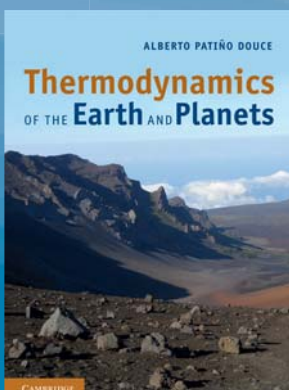
Presents case studies from across the geosciences to provide a fascinating and accessible introduction to this emerging field.



Mantle Convection for Geologists

Geoffrey F. Davies, *Australian National University, Canberra*
Hardback
9780521198004
February 2011
£35.00

An accessible explanation of the Earth's fundamental tectonic mechanism for students and researchers across a variety of geoscience disciplines.



Thermodynamics of the Earth and Planets

Alberto Patiño Douce, *University of Georgia*
Hardback
9780521896214
July 2011
£50.00

Intuitive yet mathematically rigorous introduction to thermodynamics of planetary processes for advanced students and researchers in Earth and planetary sciences.

IN THIS ISSUE

OCTOBER 2011



12 COVER FEATURE: CHARLES LYELL
Richard Fortey peeps under the vestments of Deep Time's high priest



08



18

FEATURES

- 18 THE ANTHROPOCENE**
An unprecedented opportunity to promote the unique relevance of geology, says Emlyn Koster

REGULARS

- 05 WELCOME** Cheer up and stop moaning, says Ted Nield
- 06 SOAPBOX** The geosciences need to take full advantage of the opportunities of the downturn, says Chris Leake
- 07 GEONEWS** What's new in the world of geoscientific research
- 10 SOCIETY NEWS** What your Society is doing at home and abroad, in London and the regions
- 22 LETTERS** We welcome your thoughts
- 23 BOOK & ARTS** Two reviews by Ted Nield and Nick Rogers
- 24 PEOPLE** Geoscientists in the news and on the move
- 26 OBITUARY** A distinguished Fellow remembered
- 27 CALENDAR** Society activities this month
- 29 CROSSWORD** Win a special publication of your choice

ONLINE SPECIALS

- MANY OLD IRONS** Joe McCall notes that the Opportunity rover has encountered no less than many old irons on Mars and comes up with an intriguing theory as to why

Frontiers Meeting 2011

THE COUPLING BETWEEN TECTONICS
AND SURFACE PROCESSES

14 November 2011

The Geological Society of London, Burlington House, Piccadilly, London

Frontiers Meetings are 1-day meetings focused on short presentations and discussion to explore developments in emerging geoscience areas, followed by an open access discussion forum

Further information

For further information about the meeting please contact:
Georgina Worrall
The Geological Society, Burlington House, Piccadilly, London W1J 0BG
T: 020 7434 9944 F: 020 7494 0579
E: georgina.worrall@geolsoc.org.uk W: www.geolsoc.org.uk/frontiers



Meeting sponsor

The Geological Society Careers Day 2011

Wednesday 7 December 2011

British Geological Survey, Nottingham

Careers Day is for geosciences undergraduates and postgraduates to find out about the latest career developments and opportunities.

The day will run from 10am – 4pm followed by a beer reception, and will include presentations on careers, a CV writing workshop, interview techniques workshop and exhibition fair.

Registration

The event is free to attend and covers all delegate material, lunch and a beer at the reception, but you must pre-register for the event and the workshops.

Contact information

Ellie Duncanson-Hunter
Tel: 020 7434 9944
Email: registrations@geolsoc.org.uk
Web: www.geolsoc.org.uk/careersday11

PROSP EX 2011

Business Design Centre, Islington, London
13 - 14 December 2011

Date For Your Diary

PESGB and DECC bring you the 9th show in their highly successful series of Prospects Fairs - the UK's leading networking event for exploration and development.

Eight booths added due to popular demand - Book Now to avoid disappointment



Format: Two day exhibition with a parallel speaker programme including the highly popular 'Prospects to Go' sessions.

Registration: £115 for PESGB members, £125 for non-members

Exhibition: Over 60 exhibitors from around the North Sea basin including prospectors and non-prospectors

Programme: Over 20 confirmed talks, please see our website for the current timetable

Sponsorship: To find out about sponsorship opportunities, please contact ben@pesgb.org.uk or view our website www.pesgb.org.uk

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“ THE YOUNG CHARLES LYELL. LYELL WAS TO BECOME PERHAPS THE MOST INFLUENTIAL GEOLOGIST OF THE 19TH CENTURY ”

Front cover

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NO MORE GRIEF

In 2004 Mr Boris Johnson MP, then editor of the *Spectator*, got himself into hot water by identifying what he saw as “a society ... hooked on grief and ... vicarious victimhood”. Nowhere was this more evident than among Liverpoolians, of whom he wrote: “they cannot accept that they might have made any contribution to their misfortunes, but seek rather to blame someone else for it, thereby deepening their sense of shared tribal grievance against the rest of society.”

When I read this I confess to having felt a sense of *déjà lu* - since for years I had been saying the same thing about scientists. Scientists have been rending their labcoats and wailing that nobody loves them for nearly 40 years now; despite all evidence to the contrary^{1,2}. While not realising the difference between “they don’t love us” and “they don’t love us as unconditionally as we would like”, scientists had also become half in love with easeful death.

This is not to deny that things have been tough. Locally, morale took a real battering after geology became the final full victim of the late, unlamented University Grants Committee’s last-gasp attempt at Stalinist national planning - which led to the closure of many fine Earth science departments. Geology seemed to fare little better in the subsequent “student-as-customer” world. The increasing invisibility of minority subjects - which always happens during expansions (comprehensivisation was meant to increase choice for all, but resulted in the near extinction of minority academic subjects in most schools) then kicked in during the 1990s. Even “core” subjects, including languages, felt like they were vanishing as less academic ‘customers’, flocked towards the new subjects created largely to cater for them.

But surely you don’t need to have been in the OTC (or worked in PR) to know defeatism begets defeat. Moreover, we have new reasons to be cheerful. Figures published here in June³ indicated an upswing in applications to Earth science courses; while in August, A level and Scottish Higher results were indeed followed by recruitment boosts for all sciences, by 8% in physical science as a whole, and 2% in Earth science.

So – once again - it’s time to stop looking defeated, because if we do, we will be.

DR TED NIELD EDITOR

REFERENCES

- 1** *Science and the Public A Review of Science Communication and Public Attitudes to Science in Britain*, OST Wellcome 2000
- 2** *Oh no, they love us after all*. Media Monitor, Geoscientist 11.04 April 2001.
- 3** *Reasons to be cheerful?* King, Chris and Jones, Ben. Geoscientist 21.05 pp19-21.

Geoscience and the downturn

BY CHRIS LEAKE

The geosciences need to position themselves carefully to take full advantage of the opportunities offered by the current economic climate, says **Chris Leake***



No one reading this article, whether working in the consultancy, industry, regulatory or academic fields, will need reminding how badly geosciences have been hit by the economic downturn. However, adverse effects of the recession have been inconsistent, both sectorally and geographically. A survey of these effects is useful for identifying where opportunities for growth exist; it could indeed be argued that the economic downturn has acted as a crude indicator of the perceived value of various geoscience disciplines.

Within the UK, pressure on geosciences has been acute, thanks to a sharp decline in both private and public development. This has led to significant economic uncertainty and a consequent decrease in commissioning of geoscientific work. These factors acted rapidly, altering a long-established status quo, where a high reliance on development and regulatory compliance work had become the norm. It is highly unlikely that the pre-existing situation will re-establish itself soon. Individuals and companies will have to adapt to a greatly changed working environment.

Conversely, in some sectors and geographical areas growth has been significant. In Australia, for example, it has been particularly strong. Similarly, innovative exploitation of unconventional sources of fossil fuels and the still immature renewable energy markets promise significant future growth. These

observations indicate clearly that if effort is concentrated where there are 'real' (economically or environmentally driven) needs, considerable opportunities still exist.

Solving many of the challenges facing the world involve geoscience. Whether it be locating new energy resources (geothermal, oil, coal, tidal), water supply, food security, sea-level change or supply of raw materials – all are dependent to greater or lesser extent upon our subject. So why do the geosciences continue to have such a low profile in the media and public conscience? The latter has significant repercussions for the industry as it influences funding, consultancy fee rates and the overall prominence of the sector. Part of the answer may be that throughout the expansion of the field in recent times geosciences have too often been seen primarily as a burdensome expense rather than being innovative, able to add significant value or solve real problems.

To enable the many opportunities that exist in geoscience today to be exploited fully requires a sea-change in attitudes, particularly in the way in which the industry views and promotes itself. The practical application of the vast array of techniques now available to geoscientists must surely be the way forward. Geoscientists need to become far more dynamic, innovative and proactive rather than principally reactive, as has too often been the case in the past. We also need to develop lateral thinking about sources and methods of funding. These are exhilarating challenges that must now be embraced enthusiastically, with creativity and vision to ensure the future development and well-being of the geosciences. In the future, the response of our industry to the economic downturn may be seen as a significant turning point and one from which it emerged re-energised and with a clear sense of purpose.

SOAPBOX

Soapbox is open to contributions from all Fellows. You can always write a letter to the Editor, of course: but perhaps you feel you need more space?

If you can write it entertainingly in **500 words**, the Editor would like to hear from you.

Email your piece, and a self-portrait, to ted.nield@geolsoc.org.uk. Copy can only be accepted electronically. No diagrams, tables or other illustrations please.

Pictures should be of print quality – as a rule of thumb, anything over a few hundred kilobytes should do.

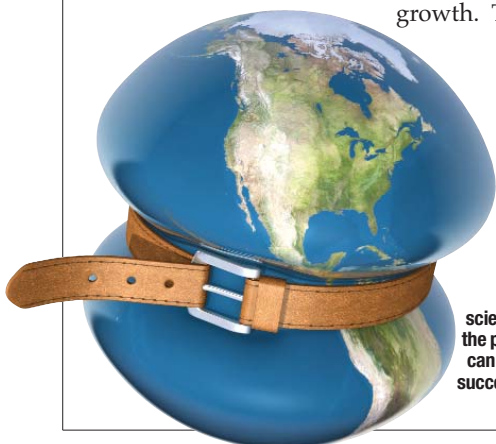
Precedence will always be given to more topical contributions. Any one contributor may not appear more often than once per volume (once every 12 months).

“
GEOSCIENTISTS NEED TO BECOME FAR MORE DYNAMIC, INNOVATIVE AND PROACTIVE RATHER THAN PRINCIPALLY REACTIVE, AS HAS TOO OFTEN BEEN THE CASE IN THE PAST
 ”

Chris Leake



* **Chris Leake** is founder and Managing Director of Hafren Water Limited, water management consultants.



Earth sciences feel the pinch, but can notch up successes too

Sensitive filling survey

New Europe-wide study reveals potential for environmental impact from filling stations. Sarah Day reports on targeting monitoring where it really counts.

HYDROGEOLOGY

The first Europe-wide, peer reviewed survey of retail filling station locations reveals that, while most are not in sensitive locations, more than one in ten is located in an area of high environmental sensitivity.

The study, published in the current Quarterly Journal of Engineering Geology and Hydrogeology¹, surveyed nearly 86,000 retail filling station sites across Europe, using five categories of sensitivity. The study was funded by CONCAWE² (CONservation of Clean Air and Water in Europe), an environmental research organisation supported by oil companies.

Sites were assessed for their proximity to surface water, groundwater and ecologically sensitive areas, and researchers found that although the vast majority fell within the lowest sensitivity categories, 14% were classified as category 1 or 2, the two highest sensitivity categories, for at least one type of environmental receptor considered.

“THE STUDY SHOWS THAT THE INDUSTRY IS ACTING PROACTIVELY AND RESPONSIBLY TOWARDS RETAIL FILLING STATION SAFETY AND ENVIRONMENTAL PROTECTION”
Dr Jonathan Smith

“The results are consistent with the experience gained through CONCAWE member companies’ own asset management programmes, but this is the first time that all filling stations have been surveyed to such an extent and the results subject to peer review”, says Dr Jonathan Smith CGeol (Shell Global Solutions (UK)), Chairman of the CONCAWE Soil and Groundwater Task Force.

“They show that the vast majority of stations are located in areas where they do not have the potential to cause



harm, but there are a small number where investing in preventive measures would be advisable.” Areas with the highest concentration of high sensitivity sites include southern England, Italy, south-west Germany and southern Poland.

If fuel were to leak from a filling station, it has the potential to contaminate the environment, depending on whether there is a way for the leaked fuel to reach a receptor such as a groundwater aquifer, river or lake. The survey assessed only the proximity of stations to such receptors, without including information on the integrity of the station or its maintenance.

POTENTIAL

“The results show only where there is potential for significant environmental impact” says Smith. “Many sites in higher sensitivity locations, as well as lower sensitivity areas, already have comprehensive engineering controls and management systems in place to minimise the likelihood of a release.”

However, the results emphasise the importance of monitoring

Above: Environmental threat? Most working service stations in Europe pose little or no serious threat to the environment. However, 14% were found to be sited in areas of high sensitivity

individual areas of concern, and investing in safety measures to prevent dangerous releases.

“The study shows that the industry is acting proactively and responsibly towards retail filling station safety and environmental protection”, says Smith. “Hopefully these results will help focus attention on those few stations which are in highly sensitive areas where a leak could cause more serious damage, and will encourage a site-specific approach to meeting the environmental goals of the EU Water Framework Directive.”

REFERENCES

- 1 K. Daines, R. Dow, G. Lethbridge, J.W.N. Smith, and K.H. den Haan An analysis of the environmental sensitivity of retail filling station locations across Europe Quarterly Journal of Engineering Geology and Hydrogeology August 2011, v. 44:307-319; doi:10.1144/1470-9236/10-058
- 2 CONCAWE - www.concawe.be/Content/Default.asp?

Earth Science Week 2011

Education Officer **Jo Mears** has news of a forthcoming major new outreach initiative for 2011 drawing together interested parties spanning the Atlantic divide



EDUCATION NEWS

Building on the established success of 'Earth Science Week', which has been run by the American Geological Institute for a number of years, the Geological Society - in collaboration with other UK partners and AGI - is organising the UK's first Earth Science Week from 10 October.

A number of activities will be taking place during that week to highlight Earth sciences and promote related events and activities being organised by others - so everyone will have the opportunity to get involved. 'Poetry Day', hosted by The Society,



takes place on Monday 10 October; and, with PESGB, we shall be running a schools poster competition on 'The Story of Oil'. We also hope to be able to teach a few (who don't already know!) how to get into Geocaching. Earth Science Week 2011 will be the start of something big, and we welcome any input!

DAILY BLOG

During the week we will also be running a daily blog, posting online lesson plans, highlighting careers in Earth science, organising free lectures for schools and Friends, providing online virtual learning kits, and offering the chance to download a phone app via the Science Council's 'Hidden Science' initiative

Above: Our Earth Science Week daily blog will include online lesson plans

(which will be Earth-Science based during October). In addition there will be region and school-specific activities: so take a look at our calendar of events to see what's on near you.

“ EARTH SCIENCE WEEK 2011 WILL BE THE START OF SOMETHING BIG, AND WE WELCOME ANY INPUT! ”

Jo Mears

MORE INFORMATION

For further information and a full schedule of events and activities, visit www.geolsoc.org.uk/earthscienceweek2011

[FUNNY OLD WORLD]

Taking the geek out of Geikie

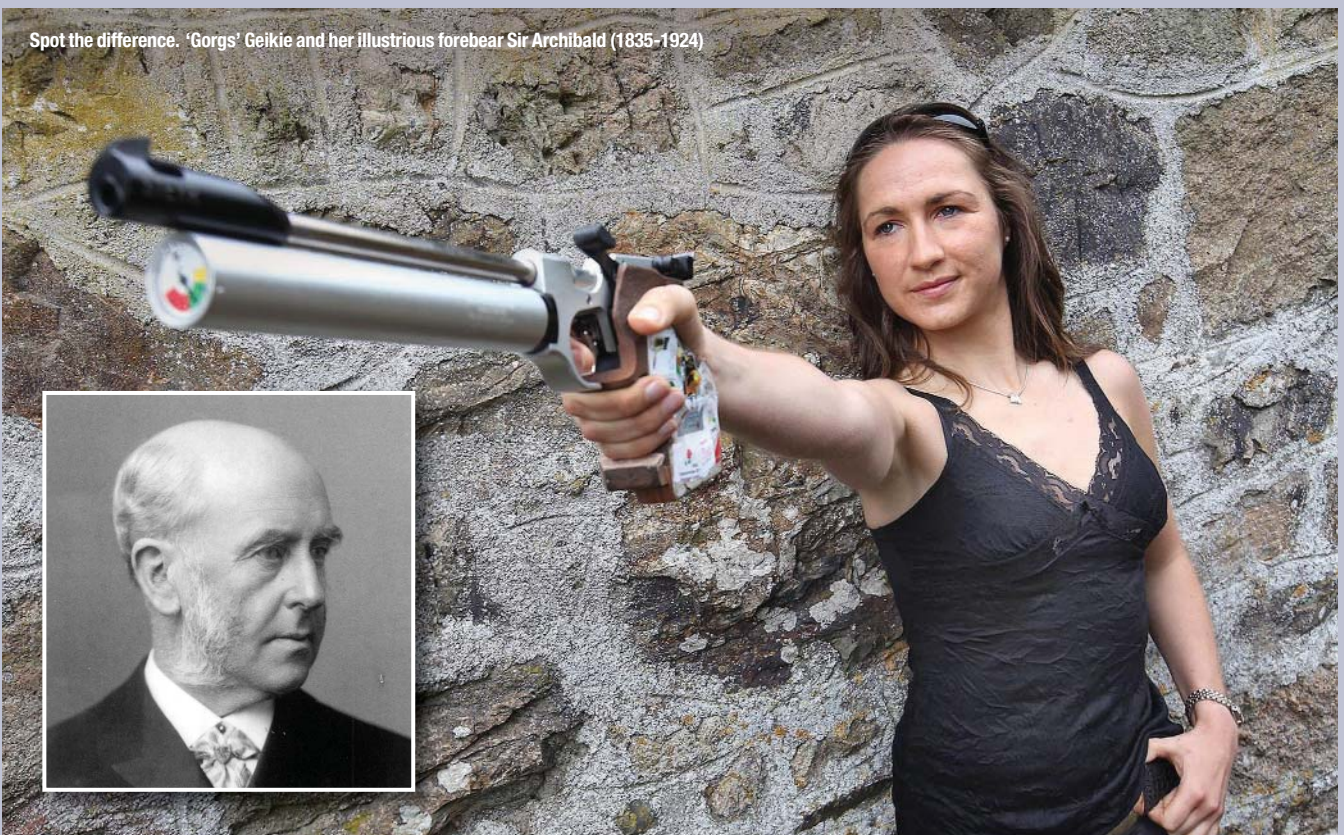
Meet Georgina ('Gorgs') Geikie, "a real-life sharpshooting Lara Croft" according to the London *Metro* (Monday August 15, p3). "Georgina has adventure in her genes being the great-great-granddaughter of Sir Archibald Geikie, director general

(sic) of the Geological Survey for Great Britain and Ireland, who travelled the world in the late 19th Century making maps. Geikie Gorge national park in Western Australia's northern Kimberley Region is named after him as is Dorsa

Geikie, a ridge system on the Moon. Georgina, 26, is a part-time barmaid in her home village of Chagford, Devon, and will find out in March if she has made the GB [Olympic] team. "It feels pretty awesome" she said."

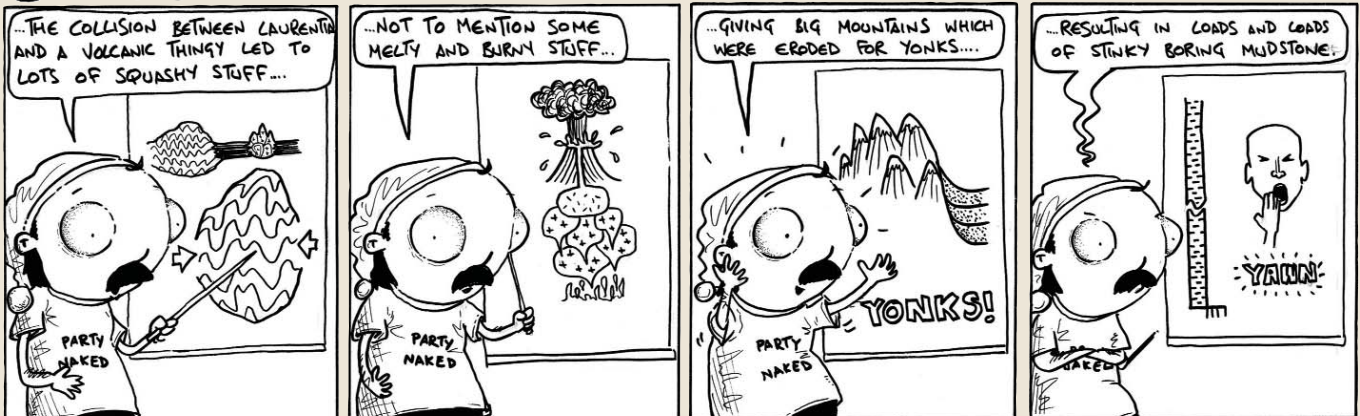
Monitor: Sheila Meredith. All contributions gratefully received. Please write to the Editor at Burlington House, or email ted.nield@geolsoc.org.uk marking your submission "snapper".

Spot the difference. 'Gorgs' Geikie and her illustrious forebear Sir Archibald (1835-1924)



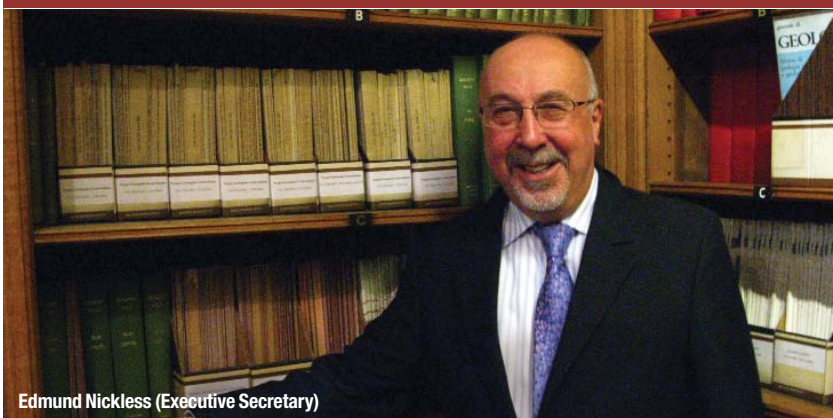
STICKS AND STONES

DUMBING DOWN.



SOCIETY NEWS

JOIN THE COUNCIL!



Edmund Nickless (Executive Secretary)

Would you consider standing for election to Council? Executive Secretary Edmund Nickless issues the annual call for nominations.

Are you willing to contribute to the work of the Society not only by becoming a member of Council and one of its standing committees, but also by serving on working groups and undertaking tasks between meetings?

Whatever your background and expertise, membership of Council enables you to influence the role of the Society in acting as a respected voice, serving society through science and profession.

Each of the 23 members of Council is a Trustee of the Society, accountable to Fellows and other stakeholders and regulators - such as the Charity Commission. Trustees' prime responsibility is to oversee the Society's affairs and act prudently in managing its finances.

Council meets five times a year, usually on a Wednesday. Four take place in the afternoon (14.00-17.00). Papers are circulated a week in advance. There is also a two-day residential meeting (early February) beginning in the afternoon and finishing mid-afternoon, the next day. Its purpose is to allow Council to discuss issues such as strategy, business planning etc.

All Council members serve on a standing committee - External Relations, Information Management, Finance and Planning, Science, Professional or Publications Management (PMC). These usually meet quarterly; though recently the PMC has developed the practice of having one virtual and three actual meetings.

From time to time, standing committees may establish short-lived working groups which could impose a further call on your time; but in agreeing to stand, ordinary members of Council should budget for a time commitment of 8-10 days a year.

If elected to Council you will play an active role formulating and delivering the Society's scientific and professional strategy, facilitating the communication of new scientific findings, engaging with and translating knowledge and expert advice to society, policy makers and government, and in certifying good practice in the geoscience professions and teaching.

▶ This month's mailing contains a nomination form. Details of the process may be found on the forms, and in the 'Governance' section of the website. Closing date for nominations is **6 January 2012**. Nominations will NOT be valid unless they are fully completed, signed and accompanied by a statement by the nominees.

▶ Please return to: **Professor Alan Lord**, c/o Executive Secretary, The Geological Society, Burlington House, Piccadilly, London W1J 0BG.

Geofacets

The Geological Society of London is making the content of the Lyell collection, including *Petroleum Geoscience*, available to Geofacets, Elsevier's web-based tool.

Samantha Kaye writes: The Geofacets tool is designed to search for, and extract, maps, sections and other geographically-referenced geoscientific data from a very large and growing volume of published content. The interface is both interactive and intuitive, using a combination of a GoogleEarth map-based browser and a text-based search tool to capture georeferenced data and images which can then be collated into an interpretation. Search results are presented as thumbnail images with links to their corresponding read-only PDFs, full text (for subscribers) and pay-per-view (e.g. via Science Direct), and selected maps can be gathered for use in GIS software. About 125,000 maps are accessible, over 75,000 being tagged with georeferenced coordinates available as GeoTIFFs for subsequent analysis.

The Lyell Collection is an outstanding resource covering the two centuries of GSL's existence. Providing access to this through Geofacets could increase significantly the value of the search tool, as well as increasing exposure for authors of Lyell content. GSL (and EAGE, as joint owners of *Petroleum Geoscience*) will benefit financially through royalties on sales of Geofacets modules and any increased demand for subscriptions or pay-per-view downloads. In addition it provides content access to users who may not be 'traditional subscribers'. Launch of a Lyell Collection Geofacets module is planned for the second half of 2011.

▶ For more information or to view a demonstration video, go to <http://www.info.geofacets.com/>



Society's Awards 2012



We invite Fellows of the Society to nominate candidates for the Society's Awards 2012. Full details about how to make nominations to the Awards Committee can be found at www.geolsoc.org.uk/awards.

■ Nominations must be received **no later than Friday 7 October 2011**. See Letters, p22.

[LECTURES]

Shell London Lecture Series



Earth's Atmosphere Trapped in Ice: 800,000 Years of Climate Change
Speaker – Eric Wolff
19 October 2011

Predictions about the future of our climate need to be

firmly grounded in knowledge of how climate has behaved in the past. Ice cores offer a unique perspective because tiny air bubbles trapped in the ice record not only of polar climate but also of the composition of the atmosphere. This enables us to view past natural changes in greenhouse gas concentrations, as well as the extraordinary growth in emissions over the last 200 years.

Eric Wolff is a Science Leader at the British Antarctic Survey (BAS) in Cambridge. He has studied ice cores from the Antarctic and Greenland for the past 30 years, and researches the chemistry of the lower parts of the Antarctic atmosphere.

■ **Programme – Afternoon talk:** 1430 Tea & Coffee: 1500 Lecture begins: 1600 Event ends.

■ **Programme – Evening talk:** 1730 Tea & Coffee: 1800 Lecture begins: 1900 Reception.

FURTHER INFORMATION

Please visit www.geolsoc.org.uk/shellondonlectures11. Entry to each lecture is by ticket only. To obtain a ticket please contact Georgina Worrall around four weeks before the talk. Due to the popularity of this lecture series, tickets are allocated in a monthly ballot and cannot be guaranteed.

► Contact: **Georgina Worrall**, Event Manager, The Geological Society, Burlington House, Piccadilly, London W1J 0BG,
T: +44 (0) 20 7432 0981 E: Georgina.worrall@geolsoc.org.uk

In association with



FUTURE MEETINGS

■ **Council & OGMs:** 30 November; Council 1, 2 February (residential); OGM 1 February 2012 (6pm); 11 April.



FROM THE LIBRARY

The library is open to visitors
Monday-Friday 0930-1730.

For a list of new acquisitions click the appropriate link from
<http://www.geolsoc.org.uk/gsl/info>

Topographic Topley



Michael McKimm describes the latest ornament to the Society's apartments – a raised relief geological map by Topley and Jordan.

The latest addition to the maps and paintings which adorn the walls of the Society's apartments in Burlington House is a *Geological model of the South East of England and part of France including the Weald and the Bas Boulonnais* (1873) by William Topley and J B Jordan. This raised relief map was presented to the Society by Topley's great grandson, Mr Keith Topley, in October 2010. After reframing by the Royal Academy it now takes pride of place above the mantelpiece in the William Buckland Room.

William Topley (1841-1894) was an important figure in late 19th Century geology: from positions in the Geological Survey and Council of the Geological Society, to editor of the *Geological Record* and President of the Geologist's Association, 'his services were in constant demand'¹. He was principally

noted for his interpretation of the geology of the Weald, the results of which were published as a memoir of the Geological Survey in 1875.

Topley produced the Geological Model in collaboration with J B Jordan of the Mining Records Office; the topography was charted by John Bartholomew and embossed by Henry F Brion. On a scale of four miles to the inch horizontally and 2000 feet to the inch vertically, the map measures 25" by 17". It was published by Edward Stanford, of Charing Cross, and sold for £1 10s².

Though the Society's copy shows some discolouration in un-coloured areas such as the sea (possibly a shellac coating has degraded) it is in good overall condition for its age, with the geological tints and printed detail well preserved. The Library thanks Mr Keith Topley for this generous donation to the Society's antiquarian map collection.

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The Geological Society Club

The Geological Society Club, successor to the body that gave birth to the Society in 1807, meets monthly (except over the field season!) at 18.30 for 19.00 in the Athenaeum Club, Pall Mall. Once a year there is also a special dinner at Burlington House. New diners are always welcome, especially from among younger Fellows. Dinner costs £50 for a four-course meal, including coffee and port. (The Founders' Dinner, in November, has its own price structure.) There is a cash bar for the purchase of aperitifs and wine.

2011: 12 October

2012: 25 January; 29 February; 28 March; 11 April (Burlington House); 23 May.

Any Fellow of the Society wishing to dine should contact Dr Andy Fleet, Secretary to the Geological Society Dining Club, Department of Mineralogy, The Natural History Museum, Cromwell Road, London SW7 5BD. Email: a.fleet@nhm.ac.uk - from whom further details may be obtained. DR

Time is of the essence, or so the saying goes. Indeed, it seems that awareness of the magnitude of time has had as profound an influence on the human psyche as the discovery of the laws of motion or the structure of matter.

One might say that Charles Lyell was instrumental in discovering time - geological time. Or to be more accurate, he presented evidence for the existence of the time necessary to explain geological history in the most persuasive way. After all, he was a lawyer by training, and he knew how to make the best case. We anglocentrics tend to think that the "discovery" of time is something with which we can credit British science. The conventional story has it that the Scottish Enlightenment threw up James Hutton, a very astute observer in the field looking at real rocks, and unlike aristocratic savants who theorised comfortably about the Earth from their armchairs. Hutton presented his findings to the Royal Society of Edinburgh in 1785 in his paper "Concerning the system of the earth, its duration and stability". Many geologists probably remember his famous phrase referring to time: "no vestige of a beginning, no prospect of an end" - from his 1788 paper read before the same society. Other geologists will have visited the volcanic rocks of Arthur's seat in the middle of Auld Reekie to see where Hutton and James Hall deduced that the rocks there had indeed been erupted as hot lavas. They saw evidence of cooled margins

and other features that asserted the primacy of trenchant observation in determining geological origins. Many colleagues have even trudged along the Berwick coast to the famous unconformity at Siccar Point which shows where the hand of time has been placed on one particular rocky outcrop.

That site is often considered symbolic of the moment (in time, of course) when it became necessary to think in terms of millions of years, not mere thousands. It requires courage to take the intellectual step to go beyond the comfort zone into the millions; to truly understand antiquity.

Hutton is probably poorly known in the world at large by comparison with his Enlightenment friends, Adam Smith or David Hume. At Siccar Point, a few miles west of St Abb's Head, he noticed that rocks that had originally been laid down under the sea had been tipped up vertically. The Earth must have been convulsed to twist rocks upwards so, and then what aeons must have passed to wear them down again until sands could flood across their planed-off contours? Hutton's disciple and companion John Playfair visiting the same place in 1788 remarked that "The mind seemed to grow giddy looking so far into the abyss of time". Giddy but perhaps exhilarated, since generous, indeed inconceivably long, swathes of time allow for a new vision of the planet, wherein mountains can be reduced to sea level by action no more vigorous than frost, wind and rain. Somewhere lurking in the background was the implication that mankind's own time might be no more than the ►

LYELL AND DEEP TIME

Richard Fortey* pays tribute to a man who did more than most to turn humans into 'a grace note in the long symphony of existence'...

Charles Lyell's portrait as a young man, from the Society's Collection, purchased for £1 in 1829



► last tick on the geological clock.

It's important to note at this point that Hutton's view of time seemed literally endless. He was attracted to the idea of perpetually repeating erosional cycles of construction and decay – almost mechanical in their way, like the rotation of the planets around the Sun, with 'no vestige of a beginning'. One might say that he instinctively recognised an almost Gaia-like affinity with the planet.

FRENCH SAVANTS

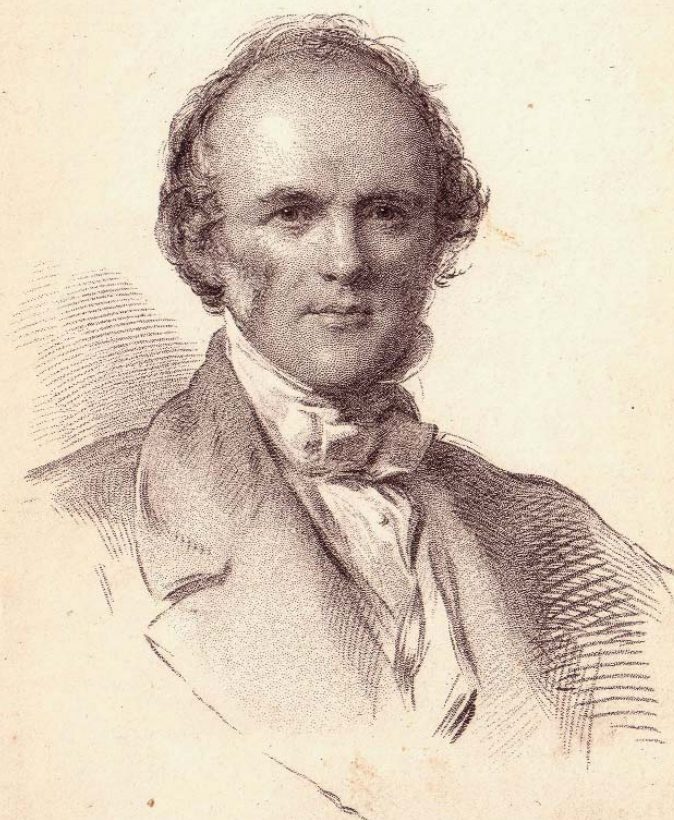
Thanks to Martin Rudwick's unparalleled historical researches, laid out in his book 'Bursting the Limits of Time', we know now that Hutton was not quite the pioneer we like to think. In fact, as so often in other scientific matters, there had been precedents for several decades over in France. The French savants before the revolution were able to take their minds into the million of years. They exchanged correspondence between themselves in what has been referred to as the Academy of Letters, without worrying too much who might have been looking over their shoulders. Some of them were even clerics, although I wouldn't want to suggest that clerics were necessarily anti-science. The Count Buffon may have got his estimate of the Earth's age based on its hypothetical cooling from the molten state entirely wrong – but the important point is that he felt free to make an estimate without nodding to religious authorities or anyone else. The freedom of thought that eventually took a revolutionary turn in France subsequently primed the minds of free-thinking souls elsewhere in the world (and remember there were strong Scottish-French connections in those extraordinary times). So assessment of time was part and parcel of a more general scepticism, when the spirit of the age began to be one of free enquiry. Matter and mathematics were all part of it. And if Rudwick is right we in England (pace Scotland) were rather late on the scene. But Buffon's estimate, however inaccurate, does presuppose a finite age for the Earth – an origin, in fact – which differs greatly from Hutton's perpetual motion machine.

Another factor in the temporal brew that is sometimes overlooked is the importance of maps. The eighteenth century was map mad. Helped by new technology such as the Great Theodolite, the Georgians mapped just



Kinnordy, Forfarshire, Scotland - birthplace of Sir Charles Lyell

KINNORDY,
THE BIRTHPLACE OF



Charles Lyell as a young man, from an early edition of the Principles



FORFARSHIRE,
SIR CHARLES LYELL.



about everything: the stars, geography, topography, seas and - early in the nineteenth century - William Smith's map outlined the geology of Britain. Smith, of course, as a practical engineer was concerned only with utility, not with time: he wanted to know where to push canals and open up quarries. But that map became almost immediately a narrative - of the succession of strata laid out in their beautiful colours - and every narrative requires one thing above all else: and that is a time frame.

So you might say that Lyell was the right man at the right moment in history. This was also a period when the Geological Society of London was one of the most cutting edge societies in the capital. It was also free-thinking - many of its founding fellows were religious Dissenters and Quakers. Whatever the surrounding circumstances, there cannot be much question that Lyell's *Principles of Geology* of 1830 (and following years) wrapped up the new science in acceptable packaging. The Geological Society provided an appropriate forum for airing its implications. Taken together, these circumstances were also instrumental in diverting the leading edge of the fledgling science from France to the English-speaking world. Its mixture of demonstrable cases studied in the field with theory - usually wrapped up in the term uniformitarianism - gave a new kind of lens through which to view nature. We wouldn't today accept the idea that geological history was a smooth story of processes operating always in the past as they do today - but then Lyell was reacting against the catastrophism of Baron Cuvier over the Channel - and chose the model that offered the clearest ground between them. I might also mention that geologising was a socially acceptable, even fashionable thing to do. Gentlemen, and ladies of refinement, could make their contribution. It never does much harm to be *à la mode*.

BEAGLE EYES

If Lyell is known to the general public today, it is probably mostly because Charles Darwin took his books with him on the *Beagle* even as they were published. Darwin and Lyell were regular correspondents later. And of course Lyell's gift of time and process informed all of Darwin's geological observations on his great voyage. ►

► Lyell donated the time frame in which evolution could operate. It was the missing ingredient from the concoction that would become the unifying theory of all biology. Although Darwin famously took years to formally set down the details of natural selection, Lyell's way of looking at the world formed his *weltanschauung*. Time made life work.

However, once the time barrier had been breached, it was only a question of how much time. The knowledge that the universe, solar system and Earth all themselves evolved through billions of years changes our relationship with the natural world. We are part of that story, but right at the end, like a punctuation mark at the end of the Bible. It still makes many people squeak with pain to feel like such an afterthought. There are even young-Earthers who deny the timescale. The fact that Lyell himself published uniformitarian geological interpretations of North American structure and strata in 1855 seems to have passed them by completely. I find it depressing that people can visit the Grand Canyon and accept the idea that it was gouged almost instantaneously.

TRANSFORMATIVE

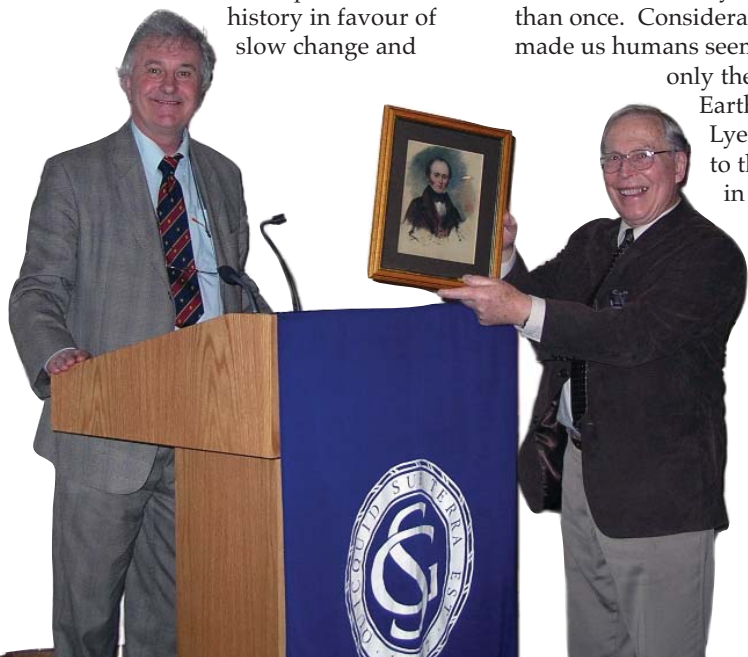
It is, of course, the notion of the immensity of geological time that is both seminal to our understanding of our place in nature and simultaneously induces panic in some people. It is truly a transformative idea that it has taken more than four billion years to shape the Earth as it is, that Hutton's cycles have not only replayed repeatedly but also changed slowly with the evolution of the planet. Lyell himself underplayed the importance of

catastrophes in Earth history in favour of slow change and

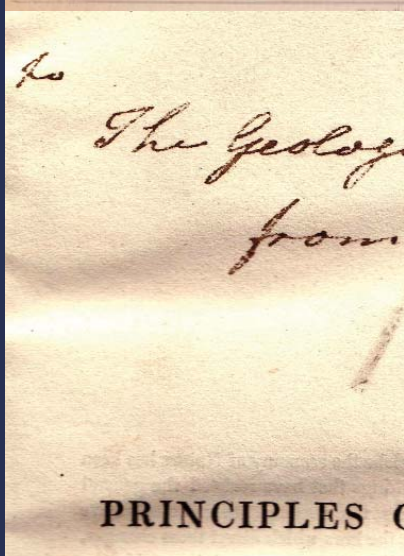
perturbations, like eruptions or earthquakes, commensurate with the Recent. Now we are comfortable with the idea that there were crises as well as continuity. In my own field of palaeontology, the greatest change in our understanding since Darwin has probably been the realisation that most of Precambrian time (to Darwin mysteriously barren) was not only full of life, albeit microscopic, but that the very business of life itself transformed the biosphere. The first appearance of respiring animals was predicated on the appearance of oxygen, and that itself was made by photosynthesising bacteria and plants; thereby transforming an early atmosphere that would have suffocated all higher life. That was the work of two billion years. The origin of life may remain a matter of speculation, but its importance in creating the balanced global geochemical system, feeding the carbon cycles, in mediating erosion, and influencing climate can no longer be gainsaid. Time and life together have made the resources we now plunder with such enthusiasm. I think it is the acceptance of this fact that has spawned a new awareness of the planet's vulnerability – an awareness sharpened by the images of our Earth taken from space, looking so small and all alone, and yet so comfortably if precariously wrapped in atmosphere and water. What time has mixed together let no man put asunder!

At the same time a sharpened historical view of geological time has proven that the progress (if one can call it that) of the planet has been far from smooth. Climate change, moving continents, and major mass extinctions have re-set the story of evolution more than once. Considerations of time alone made us humans seem important for only the briefest instant of Earth history (and Lyell himself turned to this theme in 1863 in looking for evidence of the antiquity of man); then, if we add in all those

The author being presented (by Stuart Baldwin FGS on 7 March 2008) with a portrait of Sir Charles Lyell by Scottish artist Alexander Craig. Painted in 1840 at the BA meeting, being held in Glasgow



The famous title pages of the *Principles*, with the columns of the "Temple of Serapis". The ruin, in Pozzuoli nr. Naples, was actually a marketplace



Lyell's autograph from the Society's copy of the *Principles* (1st Edn.)



The author pictured during his Presidency of the Society, with a portrait of Sir Charles Lyell peering over his shoulder. Photo: Ted Nield



Geological Society
The Author

OF GEOLOGY.



geological events, our presence on the Earth might seem no more than a concatenation of accidents. So Lyell set in motion what has become a further dethronement of our species from one at the centre of the universe made in the likeness of God to a kind of historical accident. Was consciousness itself after all just an evolutionary spin-off fundamentally no different from the tail of a peacock or the neck of the giraffe? Are we only the product of natural selection working in the context of climate change in Africa a million or so years ago?

There is at the moment a fashionable kind of macho evolutionary biologist who would concur exactly with those questions and ask no more – Richard Dawkins comes to mind. It's interesting that a different reading of the same historical scenario might lead (perhaps with Hutton) to a view that our very interconnectedness with our billions of years of history means that we are, or should be, part of a greater Earth system. Our industrial excesses, increases in CO₂, not to mention our relentlessly increasing populations, are insulting what four billion years has taken to put together. Extremists of this persuasion might compare us with a rampant weed. Earth systems science probably lies behind such the more holistic view, but I have a feeling that the more muscular reductionists would regard it as liable to become too touchy-feely, or emotionally immoderate to be taken seriously. But whatever one's personal stance, I do believe that we could place these questions about the meaning of humanity, and what our relationship should be to the planet on which we live, alongside discoveries about the fundamental subatomic building blocks of matter, or questions about the Big Bang; they are issues that affect the deepest aspects of who we are, and what we should do about it. Without the acceptance of processes working through vast stretches of time these questions would have no resonance.

PREDICTABLE

What then of progress? Darwin often wrote of 'improvement' with regard to natural selection. Are we *Homo sapiens* really 'improved' in relation to *Homo erectus*? Was there a sense in which the story of life as played out through time followed the bidding of 'improvement'? Or, to put in another way, does it have a predictable direction? Lyell's view of

the progressive changes leading to the living fauna (which lay behind his definitions of the subdivision of the Tertiary Era) does imply a sense of progress rather than a random walk. It has even been claimed by Simon Conway-Morris that there is a kind of inevitability about what happens in evolution. Famous examples of "convergent evolution", where similar functions have demanded similar morphological solutions are one thing. But Conway-Morris has gone further, to claim that a bipedal, large-eyed consciously intelligent animal is an inevitable – even predictable – outcome of the way evolutionary events play out on a planet – any planet – despite the interruptions of mass extinctions and other external events that may occasionally reset the evolutionary program. I am sure that this would be anathema to the reductionist school. However, my own reservations about this kind of scenario stem from the fact that I don't see such speculations as science at all, since, fun as they are, they can never be tested. It is never possible to rerun history, and it is always tempting to look for design. After all, that is one of the things that distinguishes us from our ancestors – well, there again, as far as we know. Of course, I am ready to revise this opinion when ET finally arrives.

Time cannot be "invented" – only discovered. Lyell helped us along the route to that discovery – but what a discovery! Its sheer magnitude should make us humble, but it is also frightening. You can almost sympathise with those time deniers who do not wish the human species to be such a grace note on the long symphony of existence. The question of how to use our moment in time has never been so pressing, so time really is of the essence.

Lyell was one of the first to appreciate that the lifespan of an individual species counts for little. That includes us. Even if we do our worst, life will go on, the cycles will turn again, mountains built and eroded and leaving their legacy as they did on Hutton's shore. It's all a matter of time. ■

* **Richard Fortey** is a former President of the Geological Society and Keeper of Palaeontology at the Natural History Museum, London.

▶ A slightly longer version of this article is available online. For a review of Richard Fortey's latest book, *Survivors – animals and plants that time forgot*, see p.23



THE ANTHROPOCENE

An unprecedented opportunity to promote the unique relevance of geology to societal and environmental needs, says **Emlyn Koster***

In their recent review of the Anthropocene concept, geologists Jan Zalasiewicz and Mark Williams, climatologist Will Steffen, and chemist Paul Crutzen¹ noted that 'over a century ago, terms such as 'Anthropozoic', 'Psychozoic' and 'Noosphere' were conceived to denote the idea of humans as a new global forcing agent'. A decade before Crutzen introduced 'Anthropocene'², cultural historian Thomas Berry proposed the term 'Ecozoic'³.

The 1960s became a pivotal decade for initial actions. Astronomer Fred Hoyle had predicted in 1948⁴ that: 'Once a photograph of the Earth taken from the outside is available – once

Above: Central perk – Anthropocene puts the eye of the world on geoscience

the sheer isolation of the Earth becomes plain – a new idea as powerful as any in history will be let loose.' This moment came in 1969, by which time zoologist Rachel Carson⁵ had emerged as a poignant influence on a rising environmental movement.

The Long Now Foundation⁶ considers that 'Civilization is revving itself into a pathologically short attention span'. The opening premise in *Humanity's Meltdown*⁷ struck a similar chord: 'Our world, our old world that we have inhabited for the last 12,000 years, has ended, even if no newspaper in North America or Europe has yet printed its scientific obituary'. Earlier this year, the US National Academies opined⁸: 'Our actions

... to reduce or increase greenhouse gas emissions will determine whether the Anthropocene is a relatively mild event or a severe transition extending over many thousands of years.'

INCONVENIENT

Surely one of the largest of all questions facing us all today is whether we are destined to continue ignoring an escalating agenda of 'inconvenient truths'. As the encompassing 'science of the Earth', how can geology play its maximum part in achieving the vital goal of sustainability? Geology uniquely brings big time and space perspectives to the planning table as an essential ►

Carbon Capture & Storage

22 and 23 November 2011

The Geological Society, London

A joint meeting between the Geological Society and AAPG

A scientific conference bringing together geoscientists and reservoir engineers seeking to understand and quantify capacity, integrity and injectivity of CO₂ storage processes.

Speakers include:

Stuart Hazeldine, *University of Edinburgh*
 Bryan Lovell, *Geological Society/University of Cambridge*
 Peter Styring, *University of Sheffield/CO₂ Net*
 Mercedes Maroto-Valer, *University of Nottingham*
 Dermot Roddy, *University of Newcastle*
 John Kaldi, *CO2CRC Australia*

Convenors:

Jon Gluyas, *University of Durham*
 Peter Kukla, *RWTH Aachen University*
 John Kaldi, *CO2CRC Australia*
 Hannes Leetaru, *ISGS, Illinois*
 Michael Stevenson, *BGS*
 Martin Blunt, *Imperial College*
 Richard Worden, *University of Liverpool*

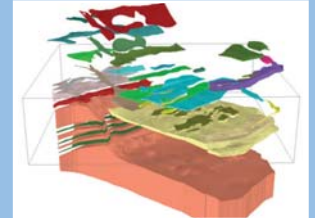
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Model Fusion Conference 2011

28th–29th November 2011



There is now a growing realisation that to answer the most pertinent questions of the age, such as adaptation to climate change and the sustainable use of natural resources, we need to model whole Earth systems, bringing together climate, ecological, hydrological, hydrogeological and geological models along with socio-economic models. This process of model fusion will provide the necessary framework in which informed decisions can be made.

Join colleagues from geological surveys, regulatory authorities, government agencies, universities, and other environmental organisations to learn more about current research on integrating environmental models from different disciplines, and the vision for the future. Also hear from key stakeholders in this process who have successfully applied emerging techniques, and network with colleagues.

Keynote speakers include representatives of the UK Environment Agency, the Met Office, as well as leading geological survey organisations.

Conference Fee:

£190.00/person (*reduced rates for Geological Society Fellows and students*)

Venue: The Geological Society

Burlington House, Piccadilly, London W1J 0BG, UK

Further information and registration:

Website: www.Model-Fusion.org

Email: information@Model-Fusion.org

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British Geological Survey

Founders' Day

LECTURE & DINNER

Thursday 10 November 2011

Founders' Day Lecture

'A Succession of Worlds' – a journey through the foundations of modern geology

Speaker: Professor Iain Stewart, *University of Plymouth*

Founders' Dinner

Venue: Le Meridien, Piccadilly

After dinner speaker: Professor Nick Petford, *Vice Chancellor, University of Northampton*

Dress: Black Tie

Ticket price: £80

Timings:

18.00 Tea & coffee served, Burlington House

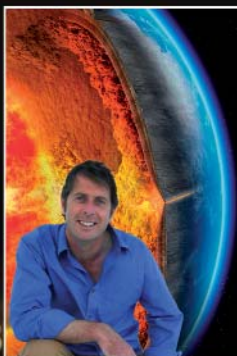
18.30 Lecture by Professor Iain Stewart

19.30 Drinks reception at Le Meridien

20.30 Dinner served

22.00 After dinner speaker

24.00 Carriages



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British Geological Survey
 NATURAL ENVIRONMENT RESEARCH COUNCIL



We've got the whole world in our hands. Or has it got us?



Mute reminders: failure to embrace our environmental responsibilities could send us the way of the Easter Islanders



Oil's wells won't end well unless we act

► frame of reference. In his refreshing perspectives on leadership, Richard Barker⁹ summarizes Aristotle's philosophy that its purpose is 'the harmonious pursuit of positive consequences in the world'. In 1990 when the Royal Society of Canada published *Planet under Stress*¹⁰, contributing physicist Ursula Franklin advocated: 'The task of the future is to build knowledge and understanding among and between citizens and scientists, so that the distinction between the two groups vanishes – so that both become citizen scientists, potentially able to solve our problems together'. Citing Franklin and others, my 1997 presidential address to the Geological Association of Canada¹¹ advocated fashioning one collective view about how to chart the next chapter of the human journey.

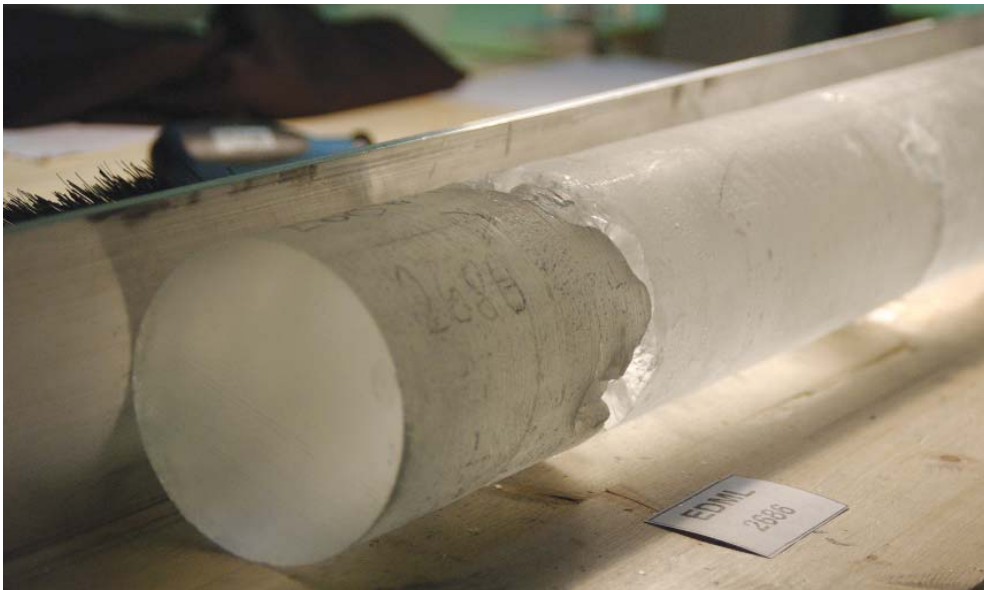
Thanks in large part to a highly successful meeting convened by GSL and the British Geological Survey under the leadership of Dr Mike Ellis (Head, Climate Change Science, BGS), the Anthropocene has recently gained unprecedented media coverage, including a cover story in *The Economist*¹², an editorial in *The New York Times*¹³, and articles in *The Guardian*^{14,15}, *The Independent*¹⁶, and on *BBC News*¹⁷, because it captures the scope of human impacts.

PIVOTAL

The pivotal question of whether the Anthropocene is enshrined in the geological timescale is now before a working group of the International Commission on Stratigraphy. Meanwhile, during 2011, The Geological Society of London has held another conference, *The Anthropocene: A New Epoch of Geological Time?* while the Geological Society of America's annual conference theme this autumn is to be: *Archean to Anthropocene; The Past is the Key to the Future*. If the ICS does indeed decide that the Holocene ended and the Anthropocene began with the start of the Industrial Revolution, or the detonation of the first atomic bomb, or some other recent global marker, I would urge that an urgent, concerted and widespread communication

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Above: Ice cores score high: tiny trapped air bubbles record the Earth's changing atmosphere

strategy be brought immediately into action.

Living in the Anthropocene will require new attitudes, dedicated resources and new 'more-than-the-sum-of-parts' partnerships. With the Quaternary research community at the helm, the entire profession of geology should make common cause with astronomy, chemistry, climatology, ecology, physics, zoology, and cultural history, as well as anthropology, archaeology, biology, civil engineering, education, geography, meteorology, philosophy, psychology, and urban planning.

That geology's holistic perspective should become integral to many important societal and scientific issues is long overdue. For the geological profession to become germane to these issues with maximum efficiency and effectiveness will require the advice of other professional disciplines specialising in how people engage with unfamiliar and complex subjects and make up their minds^{18,19}. The required 'mental repositioning' in the geosciences has a parallel in the current search for greater relevancy in science museums and exploratories^{20,21}. Although there is great urgency to adapting the mind-set of adult generations to long-term collective thought and action, forging a sustainable future also requires that we provide abundant opportunities to rekindle what

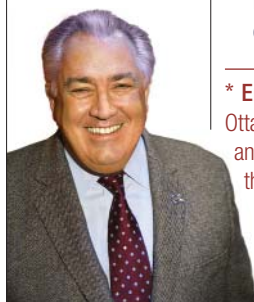
child development research has shown to be our naturally inquisitive nature^{22,23}. In future, we have to do more than increase teachers' knowledge of Earth history. There will be many more, higher 'levels of need', at which we must demonstrate the relevance of geology - both to gauging human impacts, and tackling future societal and environmental challenges.

The Anthropocene presents, in my view, geology's best chance to take its rightful place as a core contributor to the harmonious, multidisciplinary pursuit of positive consequences in the world. Thomas Berry has labeled the momentous road ahead as *The Great Work*²⁴. In geological and educational terms, the opening decades of the 21st Century are surely presenting the biggest teachable moment in the modern history of the world. ■

ACKNOWLEDGEMENTS

My thanks go to **Professor Philip Gibbard** (Cambridge University) for a stimulating discussion on the Anthropocene and his encouragement. I also thank **Dr Ted Nield**, Editor of *Geoscientist*.

* **Emlyn Koster** (BSc Sheffield, UK, PhD Ottawa, Canada) initially a university teacher and researcher became Chief Executive of the Royal Tyrrell Museum of Palaeontology and Ontario Science Centre in Canada and Liberty Science Center in the USA. His honours include Chevalier de l'Ordre des Palmes Académique.



Geoscientist welcomes readers' letters. These are published as promptly as possible in *Geoscientist Online* and a selection printed each month. Please submit your letter (300 words or fewer, by email only please) to ted.nield@geolsoc.org.uk. Letters will be edited. For references cited in these letters, please see the full versions at www.geolsoc.org.uk/letters

L'AQUILA EARTHQUAKE



Sir, I read the *Soapbox* by Russell Corbyn in August's *Geoscientist* with dismay. I am depressed that the controversy over the judicial investigation of Italian Earth scientists has rumbled on for so long, as I have seldom seen a more ill-informed debate.

The controversy centres on measures taken in the aftermath of the 6 April 2009 earthquake at L'Aquila, central Italy, which left 308 people dead, 1500 injured and 67,000 homeless. Prior to that, in 1703, L'Aquila city (population 72,800) had endured a major earthquake that killed at least 6000 people. Yet the macrozonation of seismic risk that prevailed from 1982 until 2008 placed it only in the 'moderate' category against visible evidence, and despite the fact that most of the less populous municipalities located around the city were categorised as 'high hazard'.

It was very convenient thus to designate L'Aquila. It made it cheaper to build there. The population grew at a steady 5000 per decade during the post-War boom. Many were housed in apartment buildings that collapsed in the 2009 earthquake, which seriously damaged 100,000 buildings. Indeed, casualties were heavily concentrated in buildings constructed in the 60s and 70s.

Building codes were not necessarily flouted, but they were far too weak - even bearing in mind contemporary gaps in knowledge. Hence, commentators have suggested that either there was some form of collusion or the classifiers were unable to resist political pressure - not an auspicious beginning to the present story.

The 2009 earthquake was the main shock in a swarm of tremors that began in October 2008 and did not attenuate for almost a year. In early 2009, eminent seismologists in Italy claimed that earthquake swarms in the central Apennines are highly unlikely to include anomalously large shocks. Historical evidence said otherwise.

The real controversy began when an amateur

researcher observed large local increases in radon gas emissions. His prediction was wrong by about one week and 50km, but the disaster did occur. The Italian Government's reaction before 6 April was to announce that he would be "sued for punitive damages for creating unnecessary public alarm" (although he released his prediction only to the scientists and administrators).

One week before the earthquake, L'Aquila city hosted an extraordinary meeting of the government's Major Risks Commission. The minutes were subsequently published by a national magazine. Their conclusion, set down in black and white was that "there is no reason why a sequence of low magnitude earthquakes [in the L'Aquila area] could be considered precursors of a much larger event."

One week later, the earthquake struck at 03:32 hrs. It was preceded at 00:30 by a large and alarming foreshock that sent many people out of doors. In one of the local towns, civil protection authorities sent vehicles with loudspeakers out to calm people's fears and induce them to return indoors. Most of them did so, and subsequently in that town five died and 40 were injured. It should be noted that all this preceded a further scandal, in which Italian Civil Protection was investigated for the alleged irregular expenditure or possible misappropriation of €10.6bn of public money.

It is romantic to associate the present situation with the trials of Galileo, but hardly appropriate. Of course, it is equally inappropriate to indict people on the basis of a hindsight that they did not have at the time they made decisions and took action. Nevertheless, the manifest failure to invoke the precautionary principle was noted by the Italian people who demanded some redress for lack of preparedness.

It is one thing to be unable to predict earthquakes, but sending out a wrong or unjustified message is something quite different.

David Alexander

THEY ALSO SERVE

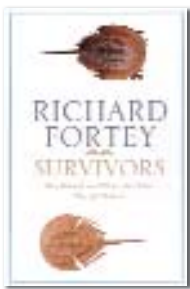
Sir, Yet another year is upon us when the Society awards medals to the good and the great in the geological world. With some dismay I see that most awards are again being given to a tight circle of academics and committee-sitters. All very worthy, and I am sure they have earned their laurels. But have not these demigods amassed praise enough? The giving of Society Awards to them may be likened to giving medals to generals. It is done because convention dictates.

I am well aware that the field of reference of the various Society awards limits the committee, and I do not in any way wish to take away from the recipients any of their recognition. But is there no way that the ordinary rank and file of the Society can be recognised? Yes, I am sure companies will push their people forward because it will look good to clients or shareholders; but competent scrutineers will see through such games. If such an award were established it would be an opportunity for the Society to award privates and NCOs in the geological world.

We read every month in the obituaries of the significant work undertaken by colleagues during their working lives. What a pity this was not recognised when they were still around to enjoy the plaudits! Is it not time that the Society set up an award for the ordinary member who perhaps does not publish, does not move the knowledge base forward, but does take what we have all learnt and uses it as their everyday tool to excel in their particular field?

Nigel Davis





Survivors

In his latest book Richard Fortey brings us a magical myth-busting tour of evolutionary survivors that have defied eruptions, impacts, ice ages and continental collisions for a very long time indeed.

From stupid creationist tracts to clever Guinness ads, evolution tends to be portrayed as linear; one form mutating into another, which replaces it; the implication being that 'newer' is intrinsically 'better'. But evolution is a bush, not a ladder. Fortey seeks out the lungfish in Queensland, and the horseshoe crab in Delaware Bay, and *Lingula* on Hong Kong mudflats and concludes: there's nothing 'inferior' about such successful organisms, just because they claim old evolutionary origins.

Textbooks tended to repeat two glib mantras about living fossils. One was that they long ago reached 'optimal adaptation'. (But what is so 'optimal' about a horseshoe crab?) The other was that they 'lacked genetic variability'. This seemed plausible until, during the 1970s electrophoretic studies of DNA showed it to be nonsense.

Lineages naturally generate species at different rates. Statistically, some will sit at the low end of the range: "every bell-curve has its tail", as Steve Gould put it. These will be rare, because low speciation is usually a recipe for extinction. But there will always be lucky ones. Lungfishes (three living genera) displayed wide variability hundreds of millions of years ago, and boasted many species. Growing morphological conservatism correlates perfectly with their falling diversity. Restriction and conservatism are two sides of the same coin.

But to survive, a species needs something else – habitat. Refugees need refugia. Fortey reveals how many biological stick-in-the-muds actually do spend their lives more or less stuck in mud – like *Lingula*. No past Earth, no matter how hostile, has ever lacked mudflats, where food supply is also never a problem. Living fossils are conservative, low diversity species, living in persistent habitats. It also helps, it must be said, not

to ask too much of life.

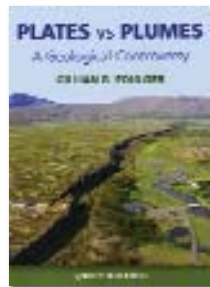
Fortey's intense, humane passion for everything that lives and has lived is amply proved on every page. This book demonstrates yet again that Fortey is, principally, not a scientist who can write, but a superb writer who happens to do science.

Reviewed by *Ted Nield*

SURVIVORS – THE ANIMALS AND PLANTS THAT TIME HAS LEFT BEHIND

RICHARD FORTEY, Published by: Harper Press;
Publication date: September 2011;
ISBN 978-0-00-720986-6 (hbk) 400pp
List price: £25.00, www.harpercollins.co.uk

▶ A TV series based on "Survivors", Richard Fortey presenting, will be aired in the New Year.



Plates vs. Plumes: A Geological Controversy

In the movie, *Being John Malkovitch*, the lead character discovers a portal into the mind of the film star, allowing him to experience life as Malkovitch for 15 minutes before being ejected into a ditch next to the New Jersey Turnpike. I feel that in reading this book I may have discovered the geological equivalent. *Plates vs Plumes* is Gill Foulger's personal polemic against the mantle plume bandwagon and is a culmination of many years' endeavour to destabilise that shaky vehicle. It is a scholarly compilation of the data, evidence and arguments that support the view that the mantle plume hypothesis is so poorly articulated, and so altered since its initial 1971 formulation, that it is now scientifically meaningless. Her alternative is that the phenomenology often ascribed to mantle plumes can be better explained by the 'Plate hypothesis', in which all melting phenomena on Earth are a consequence of processes related to plate tectonics.

The book is structured according to the nature of the argument and the evidence. After the introduction in which the plume and plate hypotheses

are clearly stated, there are chapters on vertical movements, volcanism, chronology, seismology, temperature and petrology, with a final summing up in which the author states her position that the plume hypothesis is broken. The book is well written, extensively referenced and copiously illustrated, although it is a pity that most of the figures are B&W, with a relatively small colour plate bundle, since much of the evidence is presented in the form of colour-contoured seismic sections. Extensive footnotes reference the mantleplumes.org web site, so ably championed by the author over the years, and each chapter ends with some questions for the student.

There were times when I found myself metaphorically dumped by the New Jersey Turnpike after about 15 minutes, fulminating at the unfairness of the representation of the pro-plume arguments. While many would agree with Foulger that the plume model has become all things to all Earth scientists, my reading of the plate model is that it is a similar amalgamation of a variety of postulated physical processes that may, or may not be effective in the modern mantle or in the geological past. The real challenge is to develop more sophisticated tests of the predictions of both models. It is only through closer observation that we will improve our understanding of the Earth's inaccessible interior.

Reviewed by *Nick Rogers*

PLATES VS. PLUMES: A GEOLOGICAL CONTROVERSY

GILLIAN FOULGER, Published by: Wiley-Blackwell October 2010 ISBN: 978-1-4051-6148-0 (pbk) 364pp
List price: £39.95, <http://eu.wiley.com/WileyCDA/>

REVIEWS: COPIES AVAILABLE

Interested parties should contact the Reviews Editor, Dr. Martin Degg 01244 513173; m.degg@chester.ac.uk, only. Reviewers are invited to keep texts. Review titles are not available to order from the Geological Society Publishing House unless otherwise stated.

- **Earth in 100 Groundbreaking Discoveries**, Palmer, D (2011), Quercus
- **The Geological Interpretation of Well Logs (3rd Edition)**, Rider, M & Kennedy, M (2011), Rider-French Consulting Ltd
- **The Jurassic Coast: An aerial journey through time**, Sills, P & Westwood, R (2011), Coastal Publishing

PEOPLE

► Geoscientists in the news and on the move in the UK, Europe and worldwide

Mme. Président

At the Council meeting of the European Federation of Geologists in Hungary in May, **Ruth Allington** was elected for a second two-year term as President. She talked to **Dawne Riddle**



Ruth Allington is an engineering geologist with a long and noble record of work for the Society. Lately though her interests have been directed towards Europe, via the European Federation of Geologists (EFG). EFG was founded just over 30 years ago with The Geological Society among its founders. Its member national geological associations and societies now number 22; it runs an office and a secretariat in Brussels and maintains strong links with North American professional organisations. The Society continues to be an active member of EFG through its Professional Committee (of which Ruth is a former Chair) and is licensed by EFG to award the title European Geologist (EurGeol).

PROFESSIONAL

"EFG believes that well educated and trained professional geoscientists, working with other professionals and communicating effectively with the public, are essential to ensuring public safety, promoting responsible use of natural resources and contributing to sustainable development - especially environmental protection" says Allington. "It achieves this by promoting excellence in the application of geology, through the education and continuing professional training of geologists, and by improving public awareness of the importance of geology to society."

Over the past three years, EFG has participated in number of projects directly relevant to the values and

mission of the EFG, Allington tells me - and rattles a few off.

COMMERCIAL

"The Geotrained project, for example, was co-ordinated by EFG and has developed and delivered training courses for designers and installers (drillers) of shallow ground source heat pumps. Terra Firma and PanGeo are both concerned with the commercial application of satellite monitoring of ground movements. EFG's role in both of these projects has been as a project partner, representing end-users of specialist remote sensing products. The EuroAges project has developed a qualification framework and accreditation criteria (based on learning outcomes) for geology study-programmes in Europe." Details of all of these projects can be found on the EFG website¹.

While the Society may (and does) respond to UK

government consultations from time to time, EFG participates in EU consultations, Allington says. "Most recently it responded to a European Commission Public Consultation on the Recognition of Professional Qualifications Directive and commented on the discussion paper Raw Materials for a Modern Society (February 2011)." EFG is one of the sponsoring organisations of the PERC reporting code for mineral resources and reserves.

Nor are EFG's efforts directed solely at European targets. "We are currently working with AIPG, Geoscientists Canada and others on planning the 4th International Professional Geology conference (Vancouver, January 2012), as well as planning a seminar at the 34th IGC in Brisbane next year".

► Further reading:
1. www.eurogeologists.eu

CAROUSEL

All fellows of the Society are entitled to entires in this column. Please email ted.nield@geolsoc.org.uk, quoting your Fellowship number.

■ JOE MCCALL



Joe McCall has departed from his usual geo-related writings and published a biography of his remarkable great-great grandfather, George Pilkington RE, 1785-1858. **W:** www.thepilkingtongene.com
E: joe@thepilkingtongene.com



HELP YOUR OBITUARIST

The Society operates a scheme for Fellows to deposit biographical material. The object is to assist obituarists by providing contacts, dates and other information, and thus ensure that Fellows' lives are accorded appropriate and accurate commemoration. Please send your CV and a photograph to Ted Nield at the Society.

Journals going free

Jenny Thomas FGS writes: For those wishing to collect in person, I have a long run of the Society's

Proceedings (1950 to 1998 - part 1 only). I would like to find them a good home rather than sending them for recycling. Anyone able to collect from my home (just south of Guildford, Surrey) is welcome. I could even include a bookcase to keep them in! I also have a shorter run of QJEG available."



▶ Interested parties should contact Jenny at jenny.thomas@environment-agency.gov.uk.

IN MEMORIAM WWW.GEOLSOC.ORG.UK/OBITUARIES

THE SOCIETY NOTES WITH SADNESS THE PASSING OF:

Allen, Anthony William*
Carr-Brown, Barry*
Edwards, Wilfrid Thomas*

Oates, Francis *
Uko, Suzuki*
Wilcock, Bruce

In the interests of recording its Fellows' work for posterity, the Society publishes obituaries online, and in *Geoscientist*. The most recent additions to the list are shown in bold. Fellows for whom no obituarist has yet been commissioned are marked with an asterisk (*).

If you would like to contribute an obituary, please email ted.nield@geolsoc.org.uk to be commissioned. You can read the guidance for authors at www.geolsoc.org.uk/obituaries. To save yourself unnecessary work, please do not write anything until you have received a commissioning letter.

Deceased Fellows for whom no obituary is forthcoming have their names and dates recorded in a Roll of Honour at www.geolsoc.org.uk/obituaries.

DISTANT THUNDER

Geologist and science writer Nina Morgan* eavesdrops on some home truths...

Tell it like it is

Amateurs have always played an important role in geology, often providing the 'professionals' with access to carefully gathered collections of fossils and extensive and detailed local knowledge. One such was Robert Dick (1810/11–66) who served an apprenticeship with a baker in Tullibody in Scotland and went on to work as a journeyman baker in Leith, Glasgow and Greenock before opening a baker's business in Thurso. When he wasn't baking, Dick devoted himself to the study of natural history in general, and geology in particular. He became a recognised authority of the geology of Caithness, provided valuable

assistance to luminaries such as Roderick Murchison in their research, and maintained a regular correspondence with Scottish geologist and writer Hugh Miller (1802–56). He was also a great friend Charles Peach (1800–86) – father of Ben Peach, of Peach and Horne fame – who praised Dick's cheerful manner and sparkling wit.

Cheerful he may have been, but Dick clearly didn't hesitate to call a spade a spade and speak his mind. In 1854 he wrote to

Hugh Miller:

"Do you know, I am often accused of bearing an ill-will to geologists! When I think them at fault, and am asked to speak, I merely speak what I think to be the truth. Mr John Miller here has got Murchison's thirty-shilling book, and handed

it to me to look at. Well, unfortunate fellow that I am, I saw that Sir Roderick was entirely wrong in saying that Cyclas was confined to the uppermost beds of the Old Red. I told him so, and he, as usual, thought that I was doing injury, and what not, to geology! Poof! poof! In what respect was I a gainer or Murchison a loser. Instead of being angry, you geologists should be pleased, as it shows that we pay attention to what you say."

For his part, Murchison doesn't seem to have allowed insult to lead to injury as far as his relationship with Dick went. In a letter dating from May 1857 and sent from the Museum of Practical Geology, he turned on the charm when asking for a fossil 'donation':

"... Aware of the talent you have evinced in collecting rare and good specimens of the fossil ... I venture to ask you to take some steps to supply us with a few really good things in the ichthyic line ... Pray excuse the freedom I use. I have no other

means of endeavouring to secure this desirable object."

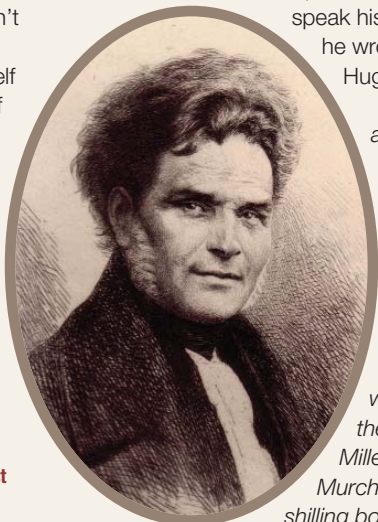
Dick responded with the gift of "a very fine specimen of *Asterolepis*". Flattery always could get you everywhere!

▶ Acknowledgement

Sources for this vignette include Robert Dick Baker of Thurso, Geologist and Botanist written in 1878 by Samuel Smiles, and Dick's entry in the Oxford Dictionary of National Biography by Michael McMullen.

▶ If the past is the key to your present interests, why not join the History of Geology Group (HOGG)? For more information and to read the latest HOGG newsletter, visit the website at www.geolsoc.org.uk/hogg where the programme and abstracts from the Conference on Geological Collectors and Collecting are available as a pdf file free to download.

* **Nina Morgan** is a geologist and science writer based near Oxford.



Amateur geologist Robert Dick (1810/11–66)

OBITUARY



PAUL CLASBY 1931-2011

Amateur geologist who became an acknowledged expert on the fossils of the Barton Beds

Many Fellows will be saddened to hear of the death of Paul Clasby on 21 February, whose expertise in Tertiary palaeontology and unstinting generosity with his time was an inspiration to all who knew him.

Paul was born in Malta on 26 August 1931, where his father was serving with the Royal Navy. The oldest of three children, his early childhood was spent in various places where his father was posted, with the family eventually settling in Beckenham. He became an unhappy evacuee to Wales

during WW2, and was sent instead to the Royal Hospital School, Holbrook in Suffolk where his aptitude for figures became apparent. A career in banking beckoned on leaving school, and he remained with what became NatWest (briefly interrupted by national service in the RAF) until retirement.

Paul's passion, though, was for science, and his interest in geology developed when he was posted by the bank to Lymington in 1966. He and his wife Jennie (m.1953), lived there ever since, close to his beloved Barton Beds of whose fossils he amassed an extensive collection, becoming a leading

expert despite his initial lack of qualifications. His collection, kept at home, was always open to invited groups and individuals. He was a founder member of the Tertiary Research Group.

The Open University was a godsend to him, allowing him to pursue his fascination with the sciences at degree level. He joined the Open University Geological Society soon after its formation and frequently led trips to Barton. His financial skills led him to become national Treasurer of OUGS for a couple of years in the 1980s. He will be remembered with gratitude by the many OU geology students who have attended the London branch revision days at Egham. Paul led the palaeontology section for the day every year until 2005.

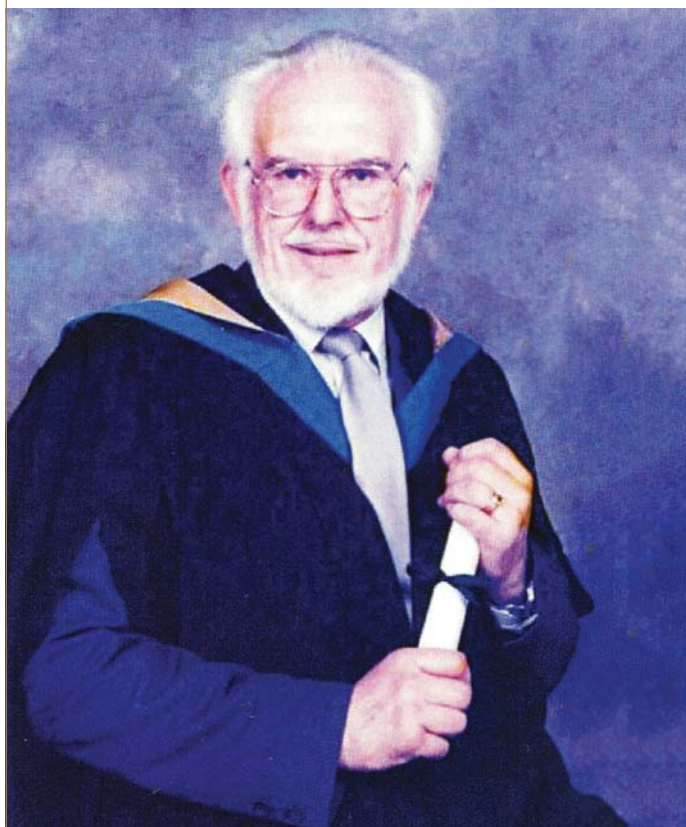
Paul was interested by Charles Lyell, with whom there was a local connection (Lyell spent his childhood at Bartley Lodge in the New Forest). Paul researched the history of Bartley Lodge, and published a pamphlet on it. It was Lyell too who brought Paul to his position as Honorary Associate Curator at Oxford University Museum of Natural History where Lyell's fossil collection had been languishing uncatalogued and uncurated until Paul started work on them, working there occasionally before his retirement from the bank in 1990, and regularly since then. Paul was an active member of the Geological Curators' Group.

Paul, a keen sailor, once sailed in the Fastnet Race, and more frequently in the Round the Island Race and in cross-Channel races. His astronomical interests led him to establish a small home observatory, and to join the Wessex Astronomical Society. Paul was even instrumental in setting up the Lymington U3A table tennis club for over-50s, serving as Lymington U3A branch chairman from 2006 until 2010. He was made President of the group on 1 April 2010 in recognition of his work. Paul was also a volunteer in the Open University Disabled Group, and spent a week or a fortnight every year for a number of years, travelling with them as a helper.

Whatever Paul set out to do, he did wholeheartedly, and his enthusiasm and warmth were an inspiration to others. He always set himself high standards, and encouraged others to do the same. He is survived by his wife Jennie, their three children Caroline, Clive and Louise, and six grandchildren. He will be sadly missed by all who knew him.

► Donations in memory of Paul are for the RNLi or for Hampshire & IOW Air Ambulance, and can be sent c/o Diamond and Son, 9 – 11 Lower Buckland Road, Lymington, Hants. SO41 9DN (T 01590 672060)

By **Barbara Cumbers**



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Safety Case Development	24-26 October	Rotes Haus Hotel, Brugg, Switzerland. This short three-day course is presented by the ITC-School and is designed for anyone with an interest in repository safety assessment.
ProGeo 2011 - Future Mining Prospects in the SW & the remediation of former quarrying & mining sites	28 October	The Kenn Centre, Kennford, Near Exeter. Further details still awaited at time of writing. See website.

Developing Geological Knowledge for CGeol Status, First Steps Ltd. For reservations and information contact Christine Butenuth, info@firststeps.uk.com, 0207 589 7394, www.firststeps.eu.com.

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DIARY OF MEETINGS OCTOBER 2011

CAN'T FIND YOUR MEETING? VISIT WWW.GEOLSOC.ORG.UK/LISTINGS – FULL, ACCURATE, UP-TO-DATE

Meeting	Date	Venue and details
Family Field Excursion to Otley Chevin, Chevin Forest Park, Geology Trail YORKSHIRE REGIONAL	1 October	Meet at East Quarry Car Park at 10.30 for 3km circular walk taking c. two hours or longer if taking interest in the special stratigraphy.
William Smith Meeting 2011 - Remote sensing of volcanoes & volcanic processes: integrating observation & modelling GEOLOGICAL SOCIETY	4-5 October	Burlington House. Bringing together people from the remote sensing communities with those involved in the modelling and field observations of volcanic. Register online.
Groundwater Heating & Cooling: Its use in bedrock aquifers and granular porous media HYDROGEOLOGICAL GROUP	5 October	Room 1.25, School of Earth and Ocean Sciences, Cardiff University, 1730 for 1800. Contact: Maria Clarkson E: swales.rg@geolsoc.org.uk
Poetry and Geology: A Celebration GEOLOGICAL SOCIETY	10 October	Burlington House. 10.00 to Reception 1830. To coincide with National Poetry Day and Earth Science Week, this event will include talks, performances, discussion and readings by contemporary poets. Register online. Contact: Georgina Worrall E: georgina.worrall@geolsoc.org.uk
Chalk Mines SOUTH EAST REGIONAL	11 October	University of Brighton 1800 for 1830. Speaker Clive Edmunds (Peter Brett Associates). Contact: John Ellis T: 01273 844087 E: j.ellis133@btinternet.com
Geological Atlas of the London Basin GEOLOGICAL SOCIETY	12 October	Burlington House, 0930 - 1700. For those with an interest in the geology of the London Basin. Details online. Contact: Michael de Freitas E: m.defreitas@imperial.ac.uk
Early Career Geologist Award 2011 Final SOUTH WALES REGIONAL	12 October	Room 1.25, School of Earth & Ocean Sciences, Cardiff University, 17.30 for 18.00. Contact: Maria Clarkson E: swales.rg@geolsoc.org.uk
Integrating Geological Understanding into Onshore Pipelines ENGINEERING GROUP	18 October	Of all engineering structures, pipelines are those most likely to encounter the widest variations in geology. Register online. Contacts: Paul Emerson T: +44 (0)1225 855002 E: paul.emerson@emdrilling.co.uk Steve Whalley T: +44 (0)20 7432 0980 F: +44 (0)20 7494 0579 E: steve.whalley@geolsoc.org.uk
Geological Disposal of Radioactive Waste: Underpinning Science and Technology GEOLOGICAL SOCIETY; RSC; NUCLEAR INSTITUTE; MIN. SOC.; RAE.	18-20 October	Loughborough University. Showcasing research relevant to geological radwaste disposal. Supported by NDA. Register online. Contact: Dr Nick Evans E: n.d.m.evans@lboro.ac.uk W: See link on GSL event page.
Earth's Atmosphere Trapped in Ice: 800,000 Years of Climate Change SHELL LONDON LECTURE	19 October	Speaker: Eric Wolff. Burlington House. Details p11.
Impacts of Land Use and Catchment Management on Groundwater HYDROGEOLOGICAL GROUP; IAH	20 October	Conference and Lecture. Ineson Lecturer: Prof. Ian White, ANU. Burlington House. Details online. Contacts: Brigid O'Dochartaigh E: beod@bgs.ac.uk Trevor Muten E: trevor.muten@tapajos.co.uk
Lyell Meeting 2011 - Islands: Palaeontology, Geology & Tectonics	24 October	Conference, Burlington House. 0900 for 0930. Free, one-day meeting aims to bring together experts on diverse aspects of the geology and palaeontology of islands. Contacts: Steve Donovan E: Steve.Donovan@ncbnaturalis.nl; Georgina Worrall T: 020 7434 9944 E: georgina.worrall@geolsoc.org.uk

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What is the Lyell Collection?

Launched in 2007 to celebrate 200 years of the Geological Society of London, the Lyell Collection is an online collection comprising the Society's journal titles, Special Publications and key book series. Cutting edge science sits alongside important historical material, all captured and presented to the highest electronic standards and benefiting from the extensive functionality of HighWire Press' platform.

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Access to the full content of the Lyell Collection is via a range of subscription options, or pay-per-view. See the table below for further details. Additional content added for the 2011 subscription year is included in Lyell Collection Complete subscriptions.



New Developments for 2011

Full functionality of H2O

All Lyell collection titles will have migrated to Highwire Press' enhanced hosting platform, benefits include:

- advanced research tools
- cross journal alerts
- instant indexing
- inter-journal linking

New titles

Two new journal titles launched on the Lyell Collection in 2010 will be included for all 2011 subscribers to Lyell Collection Complete (LCC):

- Journal of Micropaleontology
- Petroleum Geoscience

In addition, two new archival titles will be launched on the Lyell Collection in 2011 and made available to LCC subscribers at no additional charge:

- Transactions of the Edinburgh society
- Transactions of the Glasgow society



To order the Lyell Collection or individual journal titles, or request further information or a free trial, please contact:

In UK and Europe: Email: geologicalsociety@hwc.com Telephone: +31 71 524 7630

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In Taiwan, Hong Kong, Macau, SE Asia: Email: salestw@ebosco.com Telephone: +886 2 8786 0601

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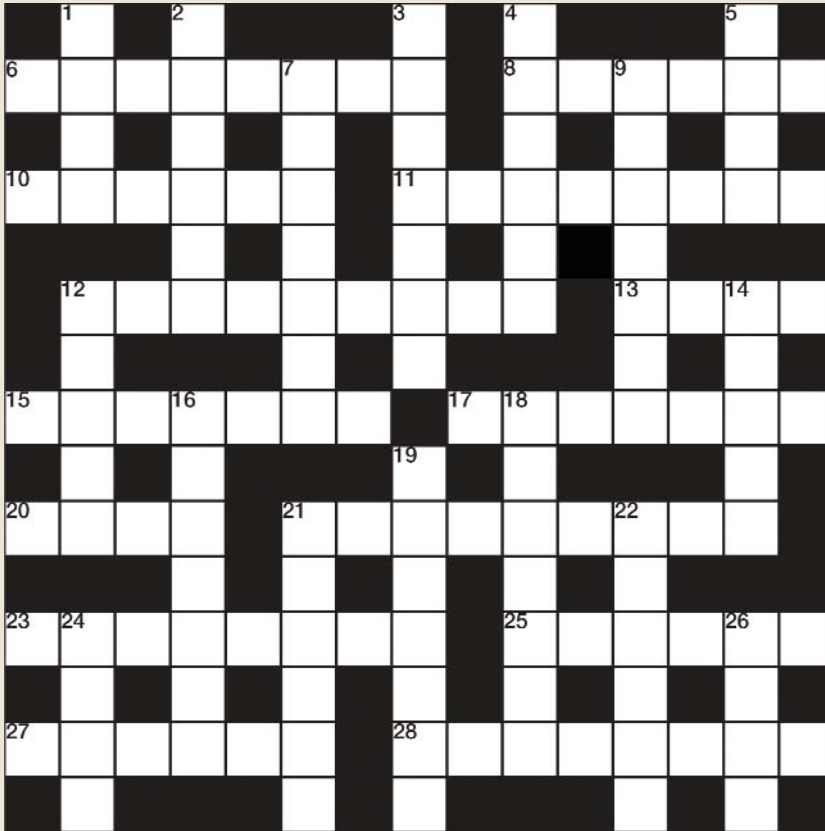
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CROSSWORD NO. 151 SET BY PLATYPUS



ACROSS

- 6** Not east of Java, but neither a place to be in 1883 (8)
- 8** Material thrown out from a volcanic cone (6)
- 10** When a metal issues under heating from its ore (6)
- 11** By-passing of a meander, usually during a flood (8)
- 12** Today, TS Eliot might have called this masterpiece "The Brownfield Site" (5,4)
- 13** Annoys (4)
- 15** Small orange citrus fruit (7)
- 17** The art of folding paper (7)
- 20** Thought (4)
- 21** Physical mementoes (9)
- 23** Fine art technique characterised by cutting, carving or engraving into a flat surface (8)
- 25** Make thinner, as a gas (6)
- 27** Deliberately stunted miniature tree (6)
- 28** Sources of ill-will(8)

DOWN

- 1** Wee coal-truck (4)
- 2** Assemblages of fused cranial bones (6)
- 3** Mountains of Kazakhstan (7)
- 4** Identically resembling a present participle but fulfilling a gramatically distinct function (6)
- 5** Forename of the great palaeontologist Schindewolf (4)
- 7** Tile in a mosaic (7)
- 9** Following, perhaps as a consequence (7)
- 12** Inflict harm (5)
- 14** Morainic feature often associated with 'kettle' in glaciated topography (5)
- 16** 'Quasi-stellar radio source', to give it its full name (7)
- 18** Snout or beak, and handy for conducting (7)
- 19** Insoluble organic component of potential sedimentary source-rocks (7)
- 21** The first Baron to advocate an absolute thermometric scale (6)
- 22** Units of gemstone weight (US spelling) equal to 0.2 of a gramme each (6)
- 24** Inert noble gas, glows red when excited electrically (4)
- 26** Source of energy (4)

WIN A SPECIAL PUBLICATION

The winner of the August Crossword puzzle prize draw was **Pauline Cooke of Newcastle Under Lyme**.

All correct solutions will be placed in the draw, and the winner's name printed in the December issue. The Editor's decision is final and no correspondence will be entered into. **Closing date - October 28.**

The competition is open to all Fellows, Candidate Fellows and Friends of the Geological Society who are not current Society employees, officers or trustees. This exclusion does not apply to officers of joint associations, specialist or regional groups.

Please return your completed crossword to Burlington House, marking your envelope "Crossword". Do not enclose any other matter with your solution. Overseas Fellows are encouraged to scan the signed form and email it as a PDF to ted.nield@geolsoc.org.uk

Name

Membership number

Address for correspondence

Postcode

SOLUTIONS AUGUST

ACROSS:

- 6** Oilstone **8** Relief **10** Habits **11** Rousseau
- 12** Competent **13** IPCC **15** Furbish **17** Bedrock
- 20** Used **21** Hecatombs **23** Chlorate **25** Bolero
- 27** Koalas **28** Eleventh

DOWN:

- 1** Sima **2** Osmium **3** Degrees **4** Irrupt **5** Tera
- 7** Oysters **9** Lustier **12** Clues **14** Cocks
- 16** Bedroll **18** Eatable **19** Screwed* **21** Hearse
- 22** Milieu **24** Hoof **26** RATP

*Due to an oversight the clue for 19D was missing from the August issue. Consequently any guessed solution, or none at all, was acceptable in this position.

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Poetry and Geology: A Celebration

10 October 2011
The Geological Society, London



Timed to coincide with National Poetry Day and Earth Science Week, this FREE one day event will include talks, performances, discussion and a reading by contemporary poets.

Speakers:
Francis Gilbert
Gordon Peters (Scottish Centre for Geopoetics)
Dr Jan Zalasiewicz (University of Leicester)
Dr Eric Robinson (Geologists' Association)
Rebecca Welshman (University of Exeter)
Matthew Griffiths (University of Durham)
Colin Will (Scottish Poetry Library)

Poets:
Matthew Hollis, Helen Mort, Alyson Hallett, Michael McKimm

For further information please contact:
The Geological Society, Burlington House, Piccadilly, London, W1J 0BG
Tel: 020 7434 9944 Email: georgina.worrall@geolsoc.org.uk
Website: www.geolsoc.org.uk/geopoetry



The Geological Society

Linout images courtesy, Jean Slee-Smith www.jeansleesmith.co.uk #geopoetry11 *-serving science & profession*



Quarterly Journal of Engineering Geology and Hydrogeology

Call for Papers

The Stone Cycle and the Conservation of Historic Buildings Thematic Issue August 2013

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Papers will form a thematic issue of the Journal to be published in August 2013

Abstracts of suitable papers should be sent no later than 16th December 2011 to:

Helen Floyd-Walker, QJEGH Staff Editor, Geological Society Publishing House,
Unit 7 Brassmill Enterprise Centre, Brassmill Lane, Bath, BA1 3JN
Email: helen.floyd-walker@geolsoc.org.uk
Tel: +44 (0) 1225 445 046 Fax: +44 (0) 1225 442 836

Authors will be contacted in late-January 2012 to confirm the suitability of their abstracts. For those deemed suitable, full papers should then be prepared in accordance with the normal QJEGH Guidelines: http://www.geolsoc.org.uk/qjegh_authorinfo

And submitted for review (<http://qjegh.allentrack.net/>) no later than 30th June 2012.



Marine Tephrochronology

26th October 2011 at Burlington House, London, UK

This one-day meeting is sponsored by the Marine Studies Group of the Geological Society of London, with additional support from the Quaternary Research Association. We invite contributions (oral or poster) on a wide-range of topics which are relevant to Marine Tephrochronology, including: tephra geochemistry; analytical advances; event-stratigraphy; land-ice-ocean correlation; geochronology and transport mechanisms. Subject to community support, the meeting conveners propose to edit a book on the same thematic topic, to be published in 2012 as a Geological Society Special Publication (<http://www.geolsoc.org.uk/gsl/publications/books/sp>) – expressions of interest are welcome from attending and non-attending participants.

Keynote Speakers

- **Christel van den Bogaard** (GEOMAR, Kiel, Germany)
- **Hafliði Haflidason** (Bergen, Norway)
- **John Lowe** (Royal Holloway, London, UK)
- **Steve Sparks** (Bristol, UK)



Meeting Co-Conveners

- **Peter Abbott** (Swansea, UK)
- **William Austin** (St Andrews, UK)*
- **Siwan Davies** (Swansea, UK)
- **Nick Pearce** (Aberystwyth, UK)
- **Stefan Wastegaard** (Stockholm, Sweden)



*main contact & scientific enquiries: bill.austin@st-andrews.ac.uk

Abstracts

Abstract submissions (one page A4) should be submitted by 1st September 2011 to Mrs Helen Olasz, School of Geography & Geosciences, University of St Andrews, St Andrews, Scotland, KY16 9AL, UK.

E-mail: ho10@st-andrews.ac.uk

(Please state your preference for oral or poster presentation)

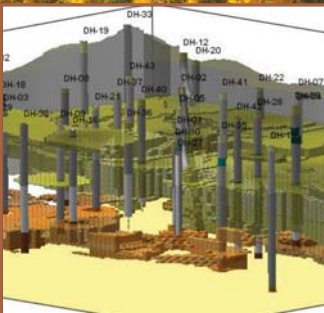


Registration

Registration (£35 - full / £20 - student) should be completed on-line by 1st October 2011 by visiting: <https://onlineshop.st-andrews.ac.uk/> (please navigate to Conferences & Events, then Geography & Geosciences)

Marine Tephrochronology

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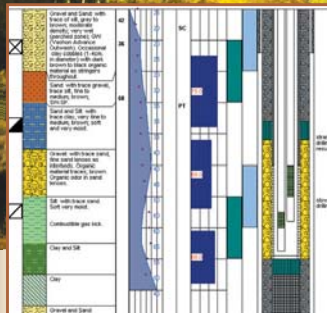


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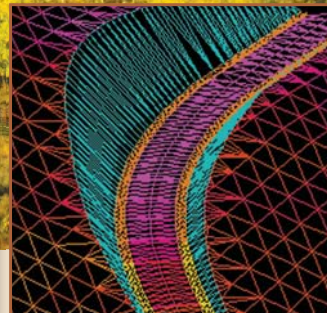


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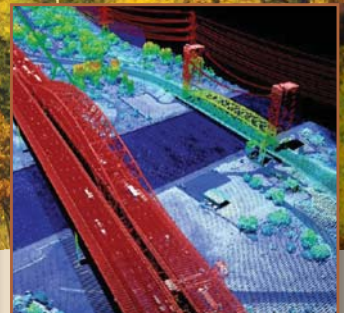


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