GEOSCIENTIST

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The Fellowship Magazine of the Geological Society of London

UK / Overseas where sold to individuals: £3.95

Under the volcano

Gravity mapping on Montserrat

THROUGH THE LOOKING GLASS
A noble savant forgotten, brought to life by his letters

REGIONAL GROUPIES
We all have one, but how often do you use yours?

LADIES' MAN
Why were de la Beche and that lady in Lyme Regis?

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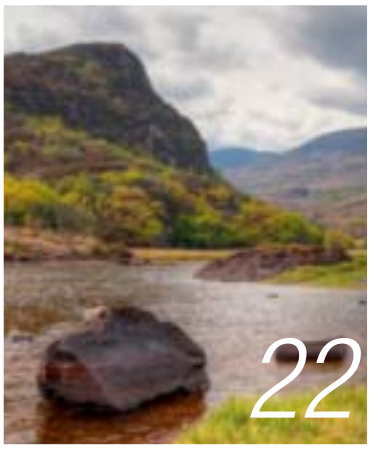


IN THIS ISSUE...

ON THE COVER:

16 Under the volcano
What gravity anomalies can tell us about the workings of a volcano. Stefanie Hautmann, recipient of the Society's Fearnsides Fund, explores the subsurface of Montserrat

ERRATUM The editor apologises to all concerned that authorship of the obituary for the late Martin Whyte (December/January 23.11 p28) was wrongly attributed to John Mather. The obituary was actually written by **Michael Romano** with help from **Fergus Gibb** and **Roger Hewitt**. This error was accidentally introduced at page make-up and sadly went unnoticed at proof.

FEATURES

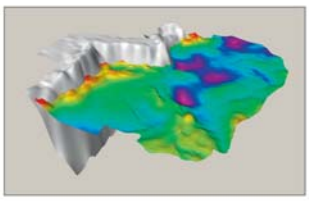
REGULARS

Call for Papers and Registration –

The 'Brae Play', South Viking Graben; Jurassic coarse-grained clastic reservoirs, structural development and hydrocarbon systems

23rd-24th April, 2014

Aberdeen



This **2-day meeting** will bring together workers from industry and academia, from both the UK and Norway, resulting in a compilation of papers which will form a comprehensive account of the petroleum geology of the South Viking Graben. Themes will range from;

- mechanisms and geometries of deposition of conglomeratic, proximal submarine fan deposits and sand-rich basin floor fans
- sediment supply systems on the graben footwalls
- structural controls on deposition and the structural evolution of the graben
- development of the hydrocarbon systems within the graben

Although primarily focussed on the South Viking Graben, contributions on relevant processes or analogues from the North Sea or elsewhere will also be included. Hopefully the results may stimulate further exploration activity in this region and also provide analogues for the exploration and development of other rift systems.

In addition, a **Core Workshop** will be held on 22nd April (pm) 2014 and a **Field Trip** to the Helmsdale area, NE Scotland, to view Brae-like sequences for a limited number of participants on 25th-27th April 2014.

Those interested in providing a paper or poster for this meeting are requested to contact the following –

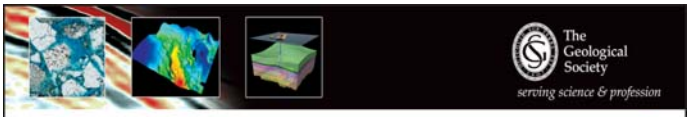
Colin Turner – ccturner@marathonoil.com
+44 (0)1224 803880

Bryan Cronin – bryan@deep-marine.com

Deadline for Paper or Poster Title Submission – 14th February, 2014

For further details and registration see:
www.braeplay.com

Twitter: @BraePlay



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Call for Abstracts Deadline: 11 April 2014

Ageing Petroleum Fields - Is there life after 50?

11-12 September 2014

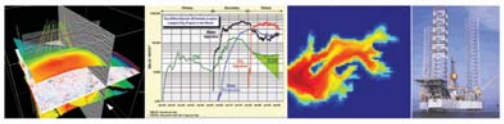
The Geological Society, Burlington House, Piccadilly, London

Convenors:

Jon Gluyas
Durham University

Michel Kemper
Ikon Science

Richard Steele
BG Group



Production of petroleum from the North Sea is fast approaching its 50th birthday (in 2015). Many of the early discovered large fields are still on production some in their second decade after the original plan for field abandonment. They still produce oil and gas at commercial rates. This picture is repeated around the globe. There are a lot of big old fields still in production. Life with these ageing assets is however not easy. As youngsters many produced oil in copious amounts with little need for understanding how the reservoir performed. As petroleum production rates have dropped and for oilfields at least, water rates have risen, optimising off-take of petroleum has become that much more difficult. The search for bypassed petroleum, untapped layers and segments has become the order of the day. Such activity demands that we better understand both the static properties and dynamic behaviour of the fields.

However, optimising the resource which is a field is not just about doing the same thing better. Old fields offer many more opportunities beyond primary and secondary recovery. Companies are looking to tertiary methods to wrest the remaining oil and possibly gas from fields. Additional value might also be created in novel ways. For example; can CO_2 disposal (carbon storage) be combined with EOR and EGR in areas other than Texas; can turning an ailing oilfield into a gas storage facility deliver additional value from the return of wet (oil bearing) gas; what value is there in the hot water being co-produced with the oil; what valuable species (solutes, gases) are also co-produced?

This two day meeting will explore the late life of oil and gas fields and ask the question; how can ageing oil and gas fields continue to deliver value decades after the initial planned abandonment date?

Themes

- Problems of late life fields
- Changing requirements in sub-surface skills
- Opportunities for EOR and EGR
- Co-produced fluids – any value?
- Subsurface value beyond last petroleum

CALL FOR ABSTRACTS:
Please email paper and poster contributions to **laura.griffiths@geolsoc.org.uk** and copy to **j.g.gluyas@durham.ac.uk** by 11 April 2014.

For further information please contact:
Laura Griffiths, The Geological Society, Burlington House, Piccadilly, London W1J 0BG.
Tel: +44 (0)20 7434 9944 Fax: +44 (0)20 7439 8975 Email: laura.griffiths@geolsoc.org.uk

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SOUFRIÈRE HILLS VOLCANO, AN ANDESITIC DOME-BUILDING VOLCANO DOMINATES THE CARIBBEAN ISLAND OF MONTSERRAT

Front cover image: © Stefanie Hautmann

FROM THE EDITOR'S DESK:

DUST & ASHES

In 1973, much to my surprise and possibly theirs, my old school named me Captain. Even the future Archbishop of Canterbury had only made Vice-captain, so it was quite an honour for this non-hearty who, like Dr Williams, had never even tried to score a try. It was my first (and last) taste of power; yet the only thing I truly relished about it was the thought of occupying a grim little basement den known from time immem. as the Head Prefect's Office.

But alas! I returned from the long vac only to find it had been converted into a toilet. For ladies. Without so much as a by your leave. We didn't *have* any ladies! Perhaps our geological headmaster (Bernard Norris FGS) had hatched some scheme to go out and get some. Who knows? Anyway, it was a cruel blow that has since become something of a life curse - a final coming into things, and finding them gone. I had always blamed Our Age, with its misguided enthusiasm for change; but after last night's meeting of the Society Dining Club I am beginning to wonder. Maybe it's me.

The Club was once thought of, at least by those who never went, as the place where all the *real* business was done, decisions were stitched, and preferment corruptly given - under the low but kindly light cast by the setting suns of science. A myth grew up that this Club, which gave birth to the Society in 1807, had become a cabal – a myth that, during the glasnost and perestroika post 1997, both Society and Club wished to dispel. I suggested that this could be achieved simply by advertising what had always been true: namely, that but for two Close meetings, any Fellow of the Society may attend. This magazine has done so ever since. And attendance has been going down ever since, too.

All extinctions have multiple causes. Conventional wisdom suggests that Fellows today haven't the leisure, or the money; that we as a Society are no longer a cohesive band of 'orthogeologists', who have all suffered together in the field.

But in my mind arises the unworthy thought that perhaps the real draw to the Club in the past was its sulphurous mystique. My 'remedy' may, in other words, be proving fatal.

Yes, all the Dining Club offers is fine dining in convivial geological company (and snuff). But food and fellowship are no small things, and if you live for them, it is where you will find them. Come and dine, and bring a friend. See p.7 for how to make a reservation.

DR TED NIELD, EDITOR - ted.nield@geolsoc.org.uk

SOCIETY*NEWS*

What your society is doing at home and abroad, in London and the regions

Elections to Council 2014-2015

The October 2013 issue invited Fellows to nominate new members of Council. A preliminary ballot will be conducted, the results of which will determine the list for the formal vote at the Annual General Meeting to be held on 4 June 2014.

Full details of all the candidates will be available at **www.geolsoc.org.uk/biographies** from 12:00 on 10 February, and you will also be able to vote online. (It was not possible to include this information here because the copy deadline was before the closing date for nominations.) The March issue will include full details, including a postal ballot paper. However Fellows are strongly encouraged to vote online. Please log on to the Fellows-only area of the website **www.geolsoc.org.uk/vote2014** to vote.

➤ The closing date for online and postal voting, will be **31 March 2014**

Great Exhibition lives on

...and what is more, still handing out grants, *reports Stephanie Jones.*

For reasons currently lost in the mists of time, the President of the Geological Society is an ex-officio Commissioner on the (remarkably) still-extant Royal Commission for the Exhibition of 1851, established by Prince Albert to stage the Great Exhibition in the Crystal Palace.

Using the profits from the first (and still the most successful ever) world trade fair, the 1851 Royal Commission now awards a range of fellowships and grants to support science and engineering research and industrial education across the UK. It has previously funded such luminaries as Professor Peter Higgs, Sir James Chadwick and Paul Dirac.

We would like to draw Fellows' attention to funding opportunities from the Royal Commission, namely: Research Fellowships in Science and Engineering (closing date, 20 February 2014).

➤ For further information visit: **www.royalcommission1851.org.uk**

Image: Dolce Vita / Shutterstock.com

LONDON LECTURE SERIES

Oil and Gas in the Arctic

Speaker: Dr Alastair Fraser (Imperial College)
Date: 19th February

Programme

- Afternoon talk: 1430pm Tea & Coffee: 1500 Lecture begins: 1600 Event ends.
- Evening talk: 1730 Tea & Coffee: 1800 Lecture begins: 1900 Reception.

Further Information

Please visit **www.geolsoc.org.uk/gsllondon lectures14**. Entry to each lecture is by ticket only. To obtain a ticket please contact the Society 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: **Naomi Newbold**, The Geological Society, Burlington House, Piccadilly, London W1J 0BG, **T:** +44 (0)20 7432 0981 **E: Naomi.newbold@geolsoc.org.uk**

Hong Kong visit

David Shilston and Bill Gaskarth meet Professor Teng Fong Wong and Dr Jason Jian Zhang during their recent visit to Hong Kong

Hong Kong Regional Group celebrated its 12th Anniversary Dinner in the presence of the President. *Stuart Mills (Chair) reports.*

Fellows of the Geological Society of London (GSL) and guests celebrated the 12th anniversary of the Hong Kong Regional Group (HKRG) on Friday 22 November 2013. The occasion was marked by a dinner at the Hong Kong Football Club, where we were joined by David Shilston, GSL President, along with the Society's Chartership Officer, Dr Bill Gaskarth. David gave us an entertaining and thought-provoking presentation on the geology and engineering of the LUSI mud volcano disaster in Java.

The HKRG can look back on the last 12 years with pride, having arranged numerous meetings, fieldtrips and conferences; maintaining professional standards; promoting the role of geoscientists; liaising with related professional bodies; and facilitating mentoring and scrutineering for chartered geologist candidates in Hong Kong.

We hope that the coming years will be even more successful, as we build on the legacy we have been bequeathed, maintaining our busy programme of events and undertaking new initiatives to improve mentoring; promote geology in schools; and further raise professional standards. To help us with this, the HKRG is always pleased to hear from geoscientists interested in sharing their experiences and ideas with our group.

All members of the committee contributed to the anniversary dinner's success, but special thanks go to James Collins, Kitty Chan and Philippa Halton for their tireless efforts. Thanks also go to David and Bill for taking the time out from their busy schedules to visit us in Hong Kong.

Policy update

The policy team has had a busy summer, responding to inquiries into Carbon Capture & Storage (CCS) and Extractive Industries, the Scottish Planning Framework, and the National Curriculum Review. *Flo Bullough reports.*

The Society continues to be active in communicating the science of CCS to policy-makers and the wider public. Events in 2013 on this topic include the Shell Lecture in May and a panel discussion on policy implications at the end of a 2-day CCS conference in January. The House of Commons Energy and Climate Change Committee inquiry into CCS provided an opportunity to highlight the vital role of geology in establishing the feasibility of CCS and implementing it at scale.

The response was a substantial document, written together with the Petroleum Engineering Society of Great Britain, on topics including different types of geological settings and carbon trapping mechanisms, potential storage capacity and its scope to abate carbon emissions, and barriers to implementation. We have been asked to identify a witness to provide oral evidence to the inquiry as a result. The Society's response can be found at **www.geolsoc.org.uk/CCS-inquiry13**.

The Society was also involved in a Policy Lab discussion meeting on CCS held at the Royal Society on the 12 June entitled *'Capturing an opportunity, or storing up trouble? CCS in the UK and Europe'* to launch a report on the prospects for CCS in Europe by the European Academies Science Advisory Council.

In September, the Society responded to an inquiry launched by the Business, Innovation and Skills Committee inquiry into the Extractive Industries, bringing to bear the expertise of our Fellowship across the wide range of geological resources that could be considered under this banner, including metals, aggregates, hydrocarbons (including unconventional gas such as shale gas), groundwater and geothermal energy. Our response can be found at **www.geolsoc.org.uk/extractive-inquiry-13**.

Curriculum

The policy team has also continued its work on the National Curriculum Review, responding to a further consultation on the proposed new science and geography programmes of study at Key Stages 1-3, and another on proposed GCSE content. Natural Environment Research Council (NERC) consulted on its draft strategy (now published) and on its ongoing review of the governance and ownership of NERC centres – the Society responded to both consultations. We also responded to a Scottish Government consultation on the Scottish Planning Framework setting out the importance of the geosphere to supporting ecosystem services, and the geoscientific capacity required within statutory bodies to implement policy. Our response highlighted the serious backlog of potential SSSI sites awaiting designations by Scottish Natural Heritage.

Following the event we attended in the Welsh Assembly in May, the policy team participated in sister events organised by the Royal Society of Chemistry on behalf of the wider science community. *'Science and the Stormont'* took place at the Northern Ireland Assembly in Belfast in October, and *'Science and the Parliament'* at Our Dynamic Earth in Edinburgh in November. The theme for both these events was the contribution of science and engineering to health – each featured a series of talks, as well as an exhibition, which provided an opportunity for representatives from science orgnisations to meet parliamentarians and officials. An area of particular discussion and interest at the Stormont event was shale gas. In Edinburgh, the day included a 'Question Time' session, with MSPs from different parties discussing, among other things, the potential impact of Scottish independence on science research funding.

Shale gas

The Geological Society is embarking on a new initiative to bring the geoscience behind shale gas exploration, production and environmental management in the UK to an audience of decision-makers, potential investors, others in the hydrocarbons and energy supply chain, and other stakeholders with an interest in shale gas. *Shale UK 2014* (4-5 March, Millennium Gloucester Hotel, London) will bring together this wider audience with leading experts from the UK, US and elsewhere, to explore state-of-the-art geoscience across a range of relevant specialisms.

This major conference builds on work the Geological Society has been doing over the past couple of years to try to ensure that discussion and decision-making about shale gas is informed by high quality impartial geological research and evidence, including public briefing meetings and documents, responses to parliamentary inquiries, and briefings with policy-makers. We are working with Global Event Partners (GEP), a commercial conference organiser, to deliver this event – a new departure for the Society, which we have undertaken in order to attract an audience of influential decision-makers and stakeholders who we would not otherwise be likely to reach.

We hope the conference will also be of interest to Fellows, for whom GEP is offering a discounted rate.

➤ For more information about the conference, visit **www.shaleuk.com**, or email **shale@geolsoc.org.uk**

NEWS IN BRIEF

Future meetings

Dates for meetings of Council and Ordinary General Meetings until June 2014 shall be as follows:
➤ 2014: 5 February; 9 April

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, or at another venue, to be confirmed nearer the date. Once a year there is also a buffet dinner at Burlington House. New diners are always welcome, especially from among younger Fellows. Dinner costs £55 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. 2014: 5 February (Burlington House); 5 March (Ath); 14 May; 24 September; 15 October.
➤ Fellows wishing to dine or requesting further information about the Geological Society Club, please email Cally Oldershaw (Hon Sec) at cally.oldershaw@btopenworld.com or T: 07796 942361. *DR*

Agreement signed

The Society has reached an agreement with the International Arctic Science Committee (IASC) to publish books on geoscience topics. IASC's Action Group on Geosciences (AGG) is to advise on long-term opportunities and priorities in geoscience research and plans to commission a Special Publication on key issues in Arctic geoscience.
➤ More information: www.iasc.info

SOCIETY*NEWS...*

Library survey and collection

Last year Fellows were invited to respond to an online survey on Library usage and satisfaction. *Fabienne Michaud reports.*

The results have been considered in the development of the Society's new Collection Development Policy, which is designed to provide a clear framework and a sound foundation for the future of the Library's collections.

A Working Group led by Richard Hughes was formed to review the policy. A survey was recommended to seek the views of the Fellowship on the value and role of the Library and subject priorities for future acquisitions. The questionnaire was sent to a random sample of the Society's Fellows:

- 35% of all those registered for remote journal access ("Athens users")
- 35% of those not registered ("non-Athens users").

The response rate was of approximately 15%, and the headline messages were:

- 56% of respondents use the Library in some way (81% of Athens users; 45% of non-Athens users).
- 13% of respondents use Library services at least once a month (22% of Athens users; 9% of non-Athens users)
- 73% of Athens users and 29% of non-Athens users use the physical Library.
- 88% of Library users see the Library as being of first or second resort (43% first resort; 45% second resort), with only 12% seeing it as a Library of last resort.
- 81% of respondents think the subject coverage of resources provided by the Library caters for their needs well or very well.

Priority areas

High priority subject areas, unsurprisingly, reflect the Fellowship make-up, with engineering geology, structural geology, petroleum geology and environmental geology being most popular. Regional geology titles were also of notable interest. Respondents from the academic sector had a wider range of subject interests than their colleagues from industry, but most respondents from both groups thought the Library covered their subjects well.

The results of the survey will not be used in isolation when decisions on future disposals and acquisitions are made, but as part of a matrix of factors including journal usage and cost-per-use data.

➤ You can read the draft document online at **www.geolsoc.org.uk/CollectionDevelopmentPolicy** Council will discuss the document in early April. Please email any comments and suggestions to the Library **library@geolsoc.org.uk** by 7 March

Image: lightpoet/Shutterstock.com

FROM THE LIBRARY

Schlumberger sponsors Lyell Collection access

The Society is pleased to announce a three-year extension of its Schlumberger-sponsored programme enabling developing country access to its publications. *Anne Davenport reports.*

Under this scheme, NGOs and libraries at research and educational institutions in developing countries are eligible for free access to the Lyell Collection.

The scheme is operated by the International Network for the Availability of Scientific Publications (INASP) a development charity working with a global network of partners to improve access, production and use of research information and knowledge, so that countries are equipped to solve their development challenges.

For over 20 years INASP has been working to support research and knowledge systems and many elements of the research communications cycle in 20 partner countries and 80 network countries.

The Lyell Collection is available to over 400 institutions in Africa, Asia Pacific and Latin America through the generosity of Schlumberger and the organisational skills of INASP.

➤ To find out more go to **www.inasp.info/en**

Journal Subscriptions 2014

Fabienne Michaud writes: Fellows will recall that the 2010 Library Review approved by Council required a significant reduction in Library net operating cost. At its meeting on 28 November 2013, Council agreed that rather than taking journals published by Elsevier and Springer as both hard copy and online, we should subscribe to the online-only form with significant saving of cost. It is envisaged that all existing journal subscriptions would be maintained without cuts for 2014. The planned savings made complete the programme of net operating cost reduction, and the future focus will be on the development of new Library services. Fellows will wish to note that all Elsevier and Springer titles will be freely available online to Fellows both onsite and offsite.

➤ For more information about the Sponsor A Book Appeal visit **www.geolsoc.org.uk/sponsorabook**

➤ 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/info**

Be a regional groupie

Accusations that the Society is dominated by academics and London-centric are outdated and do a disservice the people who run our Regional Group network, says **Dave Jones***

The Society has 15 Regional Groups – and we are all in one, whether we know it or not. They are run by Fellows who volunteer their time, and who put on a packed programme of lectures, seminars, field trips and social events throughout the year in towns and cities across large parts of England, Wales, Scotland (and Hong Kong!).

Do you want to learn more about shale gas, forensic geology or the geology of beer? The Regional Groups have all recently had talks covering these topics, and many more. Maybe you are looking for guidance and support as you work towards Chartership? Regional Groups continually run workshops to help candidates put together successful applications.

The Groups have also been working hard to engage and inspire the next generation of geoscientists, through the Schools Geology Challenge and Early Career Geologist award. Both events, which last year culminated in their second national final, were conceived within individual Regional Groups.

Regional events also provide a fantastic networking opportunity to meet other professionals in an informal environment and share knowledge and experience. And as an added incentive, taking an active part in your Group can also contribute towards your Continuing Professional Development (CPD).

If you know of a great speaker or have suggestions on topics, then please get in touch with your closest group and make a suggestion. They are always on the lookout for events to include in their programmes.

Perhaps you feel remote from existing Regional Groups. If so, why not start a new one? We've recently seen the 'Home Counties North' Group brought back into being, while not long ago the Solent Regional Group was created to cater better for geologists in and around that corner of Southern England. If you are keen, but not sure where to begin, please contact the Fellowship office at Burlington House, who can provide the guidance you need.

And if you are thinking 'I've never received an email from *my* Regional Group' please make sure that your contact details are up to date. Log into the Fellows area on the website and make sure you are assigned to the correct Group, and that there is an email address on which you can be contacted.

The continuing success of our Regional Groups depends on continued support from the Fellowship, not only in attending the events that are laid on, but through taking part as members of their committees. So in closing, ask not what your Regional Group can do for you, but what you can do for your Regional Group!

➤ For more information visit the Regional Group pages at **www.geolsoc.org.uk/groups**

***Dave Jones** is Society Vice President for Regional Groups. He is a hydrogeologist and works for Natural Resources Wales

Image: David Evison / Shutterstock.com

Durdle Door, Dorset. Part of the 'Jurassic Coast' UNESCO World Heritage Site

SOAPBOX CALLING!

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 – please take photographs on the largest setting on your camera, with a plain background.

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).

> "THE SOCIETY HAS 15 REGIONAL GROUPS – AND WE ARE ALL IN ONE, WHETHER WE KNOW IT OR NOT. THEY ARE RUN BY FELLOWS WHO VOLUNTEER THEIR TIME, AND WHO PUT ON A PACKED PROGRAMME"
>
> **Dave Jones**

THROUGH THE LOOKING GLASS

Spencer Compton was a fossilist, Marquess and noted correspondent. **Philip Compton*** reports on a significant but overlooked figure

Above: Castle Ashby, where Spencer Compton entertained many eminent geologists of the early 19th Century

Spencer Compton (1790-1851) collected fossils. And in later life, after the death of his father in 1828, he inherited the title 'Marquess of Northampton' and the impressive estates and wealth that came with it. He acted successfully as President of many important organisations; the Geological Society (1820-22), the Royal Society (1838-48), the Royal Archaeological Institute (1845-51), the Royal Society of Literature (1849-51), and as Trustee of the British Museum (1849-51). And yet his name and reputation have been almost entirely eclipsed with the passage of time.

As a landed aristocrat, he might have been expected to be a patron of the arts and sciences. And indeed, he did subscribe to various publications, thus contributing towards scientific causes. But this image alone does hardly does justice to Compton's depth of scientific knowledge, which is visible now only when reflected in the letters written to him by his colleagues in the Geological Society.

His role was twofold; firstly he was a knowledgeable friend to the geologists, and secondly he mediated between academics and politicians, using his connections to further the cause of science and promote the establishment of geological collections in public museums.

Collections

Compton was actively involved in the purchase, by the British Museum (BM), of three major collections; those of Proby Cautley, Thomas Hawkins, and Gideon Mantell. In January 1838, when Mantell was in financial trouble, he asked Compton to communicate with the Chancellor of the Exchequer,

> SPENCER COMPTON (1790-1851) WAS A KNOWLEDGEABLE FRIEND TO THE GEOLOGISTS, AND SECONDLY HE MEDIATED BETWEEN ACADEMICS AND POLITICIANS, USING HIS CONNECTIONS TO FURTHER THE CAUSE OF SCIENCE

Spencer Joshua Alwyne Compton, 2nd Marquess of Northampton

Mary Anning, the famous fossil collector and preparator of Lyme

Gideon Mantell, discoverer of Iguanodon

Thomas Spring Rice, about the sale of his geological collection, which he duly did. In July 1838 Mantell requests Compton to be one of the five valuers of his collection, alongside Buckland, König and Stutchbury (at the BM).

One year later, in 1839, William Buckland requests Compton to push Spring Rice to provide funding for the purchase of Hawkins' collection:

"… if your Lordship would have opportunity of stating to Mr Spring Rice your opinion of the value and importance of the collection in question, founded on your own personal examination and on the opinions expressed by the highest of all authorities upon such a subject Mr Owen"

Hawkins's collections were controversial because in 1834 he sold to the BM almost perfect fossilised skeletons which he had laboriously completed by replicating missing bones, duping the two valuers (Buckland and Mantell), who persuaded the trustees to buy the initial collection for £1,250. Describing a fossil-collecting trip to Dorset in 1832, Mantell prophetically writes to Compton of Hawkins:

"Mary Anning had nothing of interest remaining except a fine group of Pentacrinites which was reserved for Mr Hawkins, the young Impon, whose fine specimens of Ichthyosauri have been the admiration of the London academs, and will I fear be the ruin of him."

Anning

It is well known that Mary Anning's gender and social status prevented her from achieving public recognition for her collecting and fossil-identification prowess; but Buckland's view of her practical skills becomes evident in a letter to Compton, where he simultaneously extols the virtues of Hawkins's collection:

"With respect to Mr Hawkins 2nd collection your Lordship seems to imagine that it is chiefly from Lyme [Regis]. This is not so the specimens at least all the best, are from Street near Glastonbury near the residence of Mr Hawkins. And they are not like those at Lyme in shale which splits and readily exposes its bones, but they are embedded in lias as hard as marble and sometimes harder, from which nothing but the unique skill and enthusiasm and anatomical knowledge of Mr Hawkins could ever extricate them, so that if those quarries were full of them they can never be seen again so good. The slates from which Hawkins carves them out wld be worthless in the hands of Mary Anning."

Compton, as friend of Mantell, Cautley and Buckland, played a pivotal but discreet role by persuading the Chancellor of the Exchequer to negotiate around the purchase of these collections, which are now housed in the Natural ▶

Richard Owen, lithograph of the skeleton 'of a young Iguanodon', actually Hypsilophodon from the Isle of Wight, 1854. From a drawing by Joseph Dinkel from a specimen in James Scott Bowerbank's collection

William Buckland of Oxford, later Dean of Westminster, who described the 'Megalosaurus'

Image: Anibal Trejo / Shutterstock.com

The British Museum, Bloomsbury, London, bought Hawkins's collections in 1834

History Museum. Having been MP for Northampton 1812-20, he was well acquainted with many political figures, and corresponded with no fewer than four Chancellors of the Exchequer; Henry Goulburn, Thomas Spring Rice, John Spencer (Viscount Althorp) and Robert Peel.

The nature of the relationships he maintained with academics can be better understood by an analysis of the vast number of correspondences between Compton and geologists at the pinnacles of their careers. The list is impressive; Whewell, Sedgwick, Owen, Murchison, Mantell, Lyell, Horner, Herschel, de la Beche, Conybeare, Cuvier and Brewster all wrote to the Marquess. There are 34 surviving letters from Buckland to Compton. Clearly he was deeply entrenched in academic circles, especially geological ones.

Buckland

In a letter from July 1832, Buckland enquires about a pocket microscope he gave to Compton, to help with his fossil analysis. In another letter, dated 10 May 1835, it emerges that Compton is godfather to one of Buckland's children:

"I will bring your unanswered letter in my pocket, and can now only plead in excuse that I was intensely busy and also unwell at the time of its arrival and afraid to venture on the voluminous reply which the number of your queries seemed to require. We have recently been overwhelmed with most severe afflictions by the loss of our 2 youngest children within 2 days, and each after a few hours illness by Hooping <sic> Cough. Your little God daughter was first taken from us, and expired in perfect tranquillity having suffered no pain during the whole of her

short illness. The little boy a year older was taken off next day in violent and dreadful convulsions."

This emotionally charged passage merges with the subject of his recent study:

"This family calamity has interfered materially with the progress of my Bridgewater Essay […] the great mass of my engravings are however finished, and some of them are very pretty especially those illustrating the mechanism of the nautilus and ammonite and the cognate families – I think I have entirely made out their mode of operation by the action of the syphuncle – I have also demonstrated proof that the Belemnite was inclosed within the body of a sepia"

Buckland obviously conferred information of a complex nature to someone who must have well understood the information being expressed. It also demonstrates his use of 'functional morphology', as it has come to be known, when interpreting fossil data. In the same letter:

"I took the liberty of assuring Mr Agassiz at Edinburgh that he might venture to calculate on your Lordship as a subscriber to his admirable work on fossil fishes. He forms a continuation of Cuvier's frogs into another class of fossil animals."

That Buckland supposed Compton would provide support to Agassiz is evidence of a deep mutual understanding of their respective scientific opinions. In other correspondence (August 1835), Buckland refers to borrowed fossils used by Agassiz in his ichthyological studies:

"I am very much obliged by your lordships prompt and satisfactory reply to my queries relating to polythalamous shells which have arrived in Seaford for quotation by me […] I expect to see Agassiz tomorrow and will enquire about your box of fishes."

The exchange of specimens went both ways, Buckland and Compton lending, borrowing, and giving each other boxes of fossils on a fairly regular basis. On 16 August 1831 Buckland wrote:

"My Dear Lord, in this box you will find a few specimens which I promised to send you and also some shells from Mrs Buckland which I trust will arrive safe – they must be unpacked most carefully or they will perish. Your little shell turns out to be a lingula. Sowerby has made a drawing of your Hamite from Earl Stoke – it is a new species. […] I am expecting here Friday and Saturday – Mr Wallich, Captn King and Mr R Brown [two botanists and the explorer captain King] and shd be very glad to get their opinion upon the beautifully white flat specimen of stratified wood in your Lordships Collection"

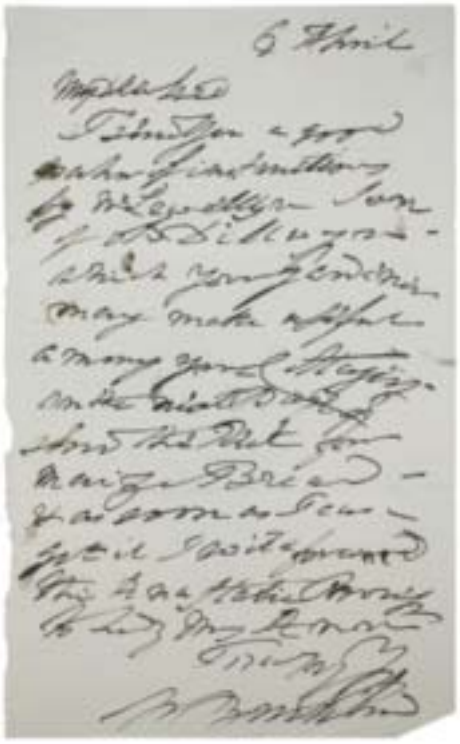
Mantell

Buckland was calling upon the advice of botanists and palaeobotanists in order to help interpret Compton's specimens of fossil flora. Seeking the advice of an expert on contemporary plant and animal life, in order to help understand and categorise fossil specimens, was common practice. Sadly, the geological content of Buckland's letters begins to diminish after 1840, reflecting Buckland's disillusionment with geology after his failure to propagate Agassiz' glaciation theory, which had been widely dismissed in geological circles in favour of the 'iceberg theory'.

The physician and palaeontologist Gideon Mantell was also one of Compton's close friends. In a letter dated July 21 1832, he vividly displays the ecstasy he felt while collecting:

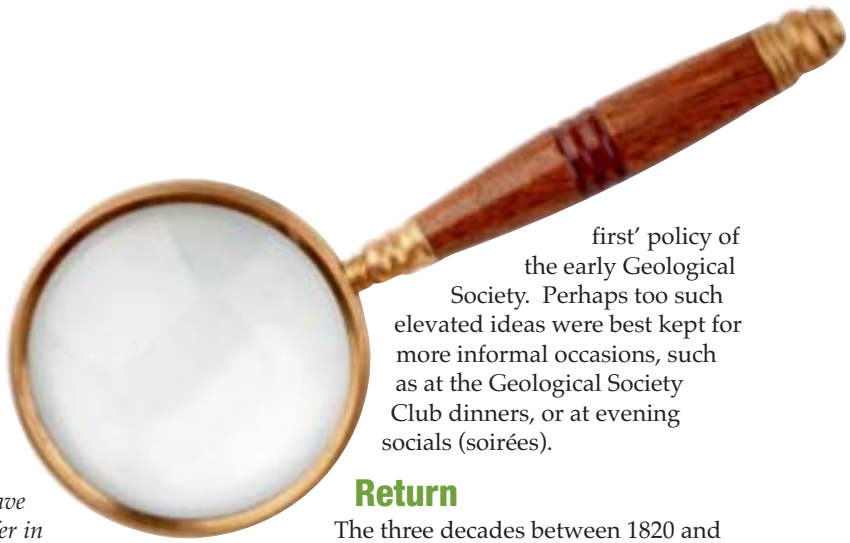
"But Portland is the most interesting spot to the geologist: Zobeide's surprise on visiting the Petrified City in Arabian Story could scarcely exceed mine (prepared as I was by Webster's paper) on seeing the forest turned into stone and lying scattered on the vegetable mould in which the plants grow; and this lying beneath many feet of limestone the ancient soil in which the Cycadeoidea flourished even now is a better mould than that in which the potatoes of the Island are growing.

"Your lordship will I am sure be gratified to learn that since my return from Oxford I have made a grand discovery in Tilgate Forest, in spite of the poachers. A large slab of grit was blown to pieces by the workmen, perceiving many portions of bones (but fortunately none that they thought were worth preserving) they wrote to me in the hope of getting something from me which they despaired of getting from Mr Trotter [the quarry manager]. I drove over, and although the fragments were numerous and the gunpowder had stained them most horribly, and the few portions of bone that were visible looked most unpromising, yet I selected some and sent them home; after many hours exercise of patience I fitted some together, and ultimately (after three journeys to the quarry in ▶



***Above:** Undated letter from William Buckland to Spencer Compton*

> THE NATURE OF THE RELATIONSHIPS HE MAINTAINED WITH ACADEMICS CAN BE BETTER UNDERSTOOD BY AN ANALYSIS OF THE VAST NUMBER OF CORRESPONDENCES BETWEEN COMPTON AND GEOLOGISTS AT THE PINNACLES OF THEIR CAREERS



search of fresh fragments) succeeded in making up a slab 4½ feet by 2½, containing six or eight vertebra <sic> in connection, some of the ribs attached, and the greater part of the pelvis, with portions of other bones scattered about the rest of the stone. I have been working on this stone many nights (for it is harder than granite) and with such success, that when finished, the specimen will be the finest the South of England has produced. I hope it is a young Iguanodon, but cannot yet tell. I have also a stone with four metacarpal bones in it! In the large mass we found many bones that supported the scales (dermal bones); the animal seems to have sunk down in a mass of vegetables numerous traces of ferns surround it."

This letter presents a first-hand description of Mantell's second great discovery, a critical moment in the history of geology. What he thought were ribs turned out in fact to be armour plating. The fossil, distinct from *Iguanodon* and *Megalosaurus*, was later named *Hylaeosaurus*, as it was found among tree ferns.

Mantell's regard for Compton, as an academic mind, is made visible in another correspondence, dated 30 August 1845:

"My Lord, being very desirous of the favour of your Lordship's opinion on the theory, which […] I have ventured to offer in explanation of the silicification of organic structures, and of the deposition of flint, I took the liberty a short time since, of leaving for your Lordship […] a copy of my "notes of a microscopical examination of chalk and flint"".

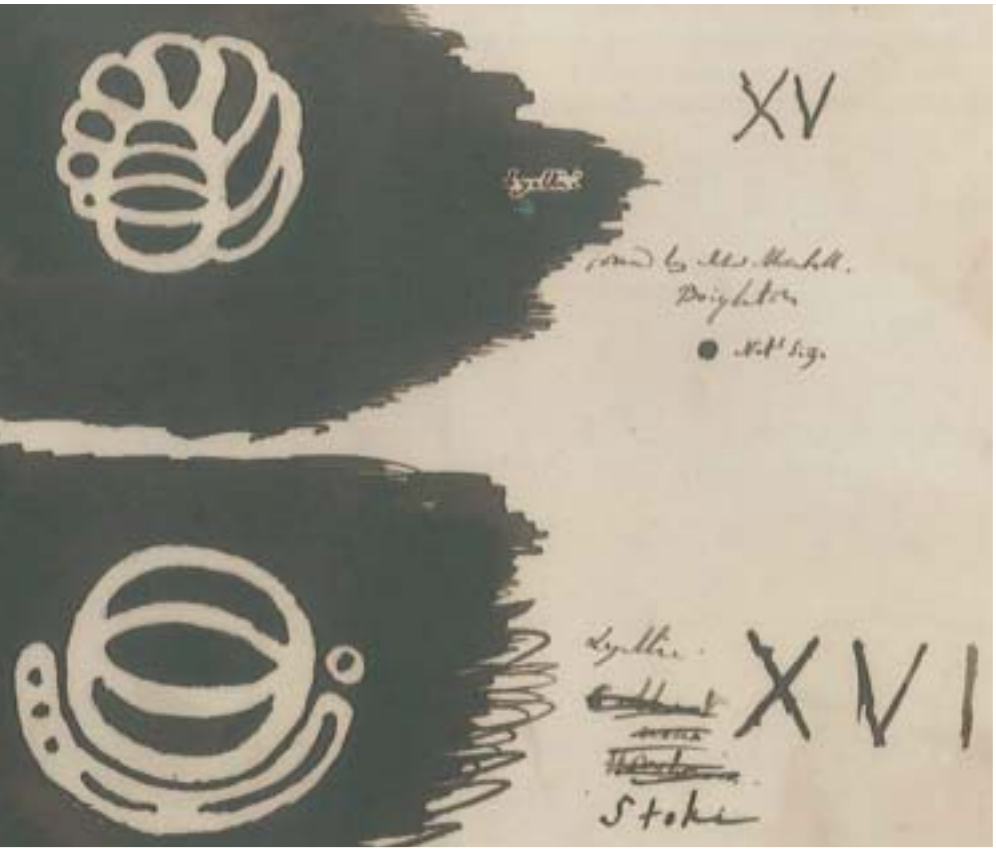
Requesting in this way Spencer Compton's opinion on such an arcane matter as the silification of organic structures, displays the high regard in which Mantell held his geological understanding. Mantell later named a spirolinite and a dinosaur (*Regnosaurus Northamptoni*) after his friend.

In the many correspondences to Compton from emergent geologists, one finds little talk of profound scientific theory. Perhaps this reflects the 'facts first' policy of the early Geological Society. Perhaps too such elevated ideas were best kept for more informal occasions, such as at the Geological Society Club dinners, or at evening socials (soirées).

Return

The three decades between 1820 and 1850 form the cultural and intellectual milieu in which Darwin's 'natural selection' theory emerged, finally being published in 1859. Those early geologists faced the problem of conceptually reconciling the physical evidence of creatures which existed a long time ago with the accepted biblical notion of the creation of beings, human or otherwise.

Microscope technology was improving rapidly, and small microscopes were becoming more widely available. Likewise, improving telescope technology had a similar effect. Both challenged traditional concepts of space at the same time as fossilised creatures, emerging from gravel and chalk pits, were challenging



Spencer Joshua Alwyne Compton, 2nd Marquess of Northampton, ink drawings of foraminifera from flint found in Sussex, 1838

traditional notions of time. Their existence conflicted with Creationist understanding, in which - according to the Book of Genesis - the world was created in six days. The possibility of 'pre-human' creation was daunting, challenging; while progressivist explanations of emerging evidence conflicted with the conventional, static view of nature.

Because Spencer Compton published in geological journals on only three occasions, he is not readily portrayed as 'a geologist'. His first two publications appeared in the *Transactions of the Geological Society*: one an ethnolinguistic/geological report on rock formations on the coast of Mull in 1821, the other a letter to Buckland on his own finds in Sicily in 1827.

Compton's final paper appeared in 1838: an abstract on spirolinites in the *Proceedings of the Geological Society*, the full article having been rejected by Stokes. Mantell was less cautious, acknowledging Compton's help in his chapter on spirolinites in his *'Wonders of Geology'*. Compton was an extremely cautious writer, conspicuously avoiding profound theory, leaving interpretation of his finds to others. Even when he tentatively ascribed names of newly discovered spirolinites after Buckland, Lyell, Mantell and Stokes, he added the proviso that the distinctions characterising the species may turn out to be insufficient.

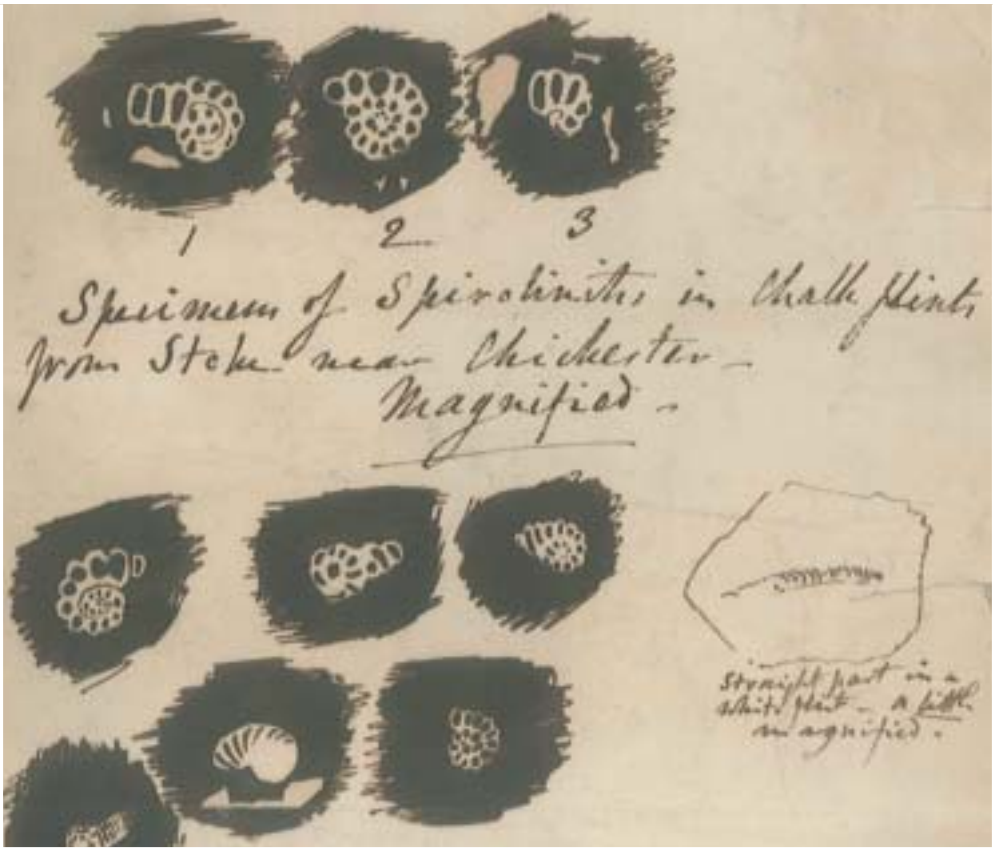
Family archive

Buried in the Compton family archives is a draft speech by Spencer Compton, entitled *'The fool has said in his heart 'there is no God"*. It says it is intended for a Christian congregation, and in it Compton places himself in the mind of an atheist, trying to conceive of chance as the formative factor in the origins of vegetal and animal species, rather than a divine creator. Even given the breadth of his academic and intellectual acquaintance, the daring content of this speech is surprising. However it seems unlikely, given the reluctance Compton exhibits in his papers to embrace or reject any theoretical explanations, that the speech was ever given. And in fact the reason for this may lie in his high position in society.

Compton tended through life to take a somewhat neutral role in everything, avoiding controversy wherever possible. This made him a popular choice to preside over intellectual and political matters, but it conversely prevented him from expounding his own ideas. And it is is here, I believe, that we find the reason for his scientific eclipse. His drive, to further the cause of science through his own position in society, has led his name to slip from the sight of academic historians of science, despite living through a time when new geological theories were profoundly affecting the way the science of geology subsequently developed. We see him today almost entirely through the looking glass of his surviving correspondence. ◆

ACKNOWLEDGEMENT
I should like to thank the current **Marquess of Northampton** (whose name is also **Spencer Compton**!) for allowing me the use of his private archives. He has sponsored my research.

***Philip Compton** works as Archive Researcher to the Estate of the Marquess of Northampton



UNDER THE VOLCANO

Stefanie Hautmann* explores the subsurface structure of the Soufrière Hills Volcano, Montserrat (West Indies) using Bouguer gravity data

Falling apples, dropped iPhones and smashed wine glasses come to most people's minds if you mention it: gravity as nuisance. However, gravity is more than an annoyance. It is the measurable force of attraction of one mass to another. In order to measure gravity, all you need is – a gravity meter.

Gravity meters are highly sensitive instruments that comprise an evacuated box with a mass inside, attached to a spring. The attraction exerted on the mass can be measured via the mechanical extension and shortening of this spring. With a portable gravity meter one may measure very tiny differences in gravity resulting from different densities of subsurface rocks. As the density of rocks in the subsurface increases, so does the gravitational attraction measured at surface. Thus, high resolution gravity data can help us to detect spatial inhomogeneities in the density distribution of the Earth's shallow subsurface. Images of subsurface density distribution (so called 'Bouguer anomaly maps') and identification of structural discontinuities in the ground are of particular interest in active volcanic regions, because they bear implications for edifice stability, fluid migration in the ground, and the subsurface transmission of volcanically induced stresses.

Soufrière

Soufrière Hills Volcano (SHV) is an andesitic dome-building volcano that dominates the small Caribbean Island Montserrat (West Indies). For almost two decades the volcano has been in a heightened state of activity, with periodically repeating episodes of lava-dome extrusion accompanied by discrete volcanic events, such as Vulcanian explosions, gas emission, ash venting, and dome collapses.

Periods of increased activity usually last for several years and are interrupted by episodes of very low volcanic activity and cessation of lava extrusion at the vent[1]. The continuing eruption has devastated an area of more than 50km^2 around the volcano, including the island's capital Plymouth and the former airport. The south of the island was abandoned in 1997 and was declared an 'exclusion zone' with restricted access. Most people left the island, while the ones who stayed had to move to northern Montserrat, which is considered as safe. Today, entry to the exclusion zone is forbidden to the public because of the threat of volcanic activity.

The persistently active SHV has been monitored since the eruption began, and the recorded data have provided unprecedented and unique insights into the eruption dynamics of an island-arc volcano. SHV is currently one of the most extensively studied actively erupting stratovolcanoes[2], though a local Bouguer anomaly map of the volcano and the island of Montserrat has been missing to date. I therefore conducted a static gravity survey on Montserrat in order to map the density distribution in the subsurface and to identify structural discontinuities. This was the first step in a project that will assess the island's gravity field, including time-dependent variations relating to changes in volcanic activity. As variations in a system cannot, however, be adequately assessed without knowledge of its steady state, the construction of a conceptual model of the island's gravity field (the Bouguer gravity map) is essential for future investigation of dynamic changes.

Field work

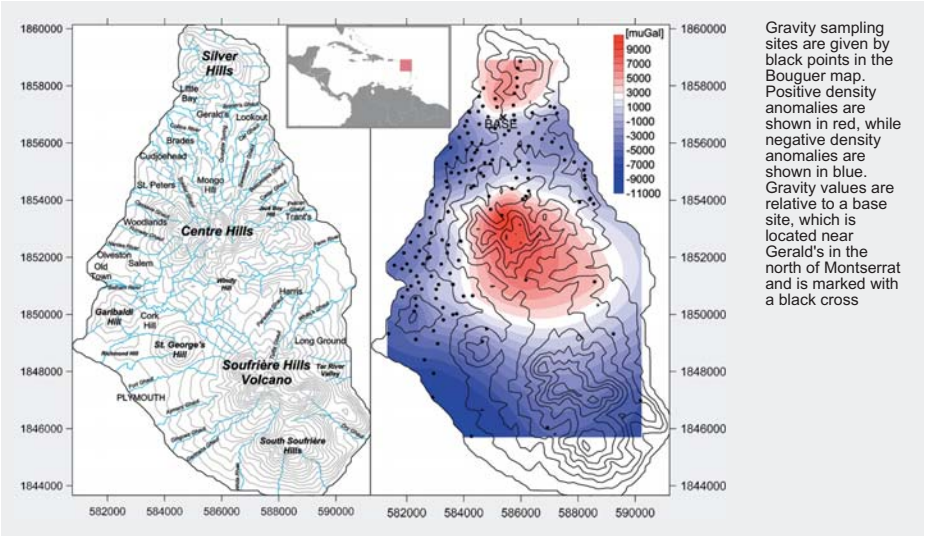
A total of 160 new gravity readings were taken across the entire island, with site positions and elevations obtained via GNSS (Global Navigation Satellite System) receiver/antenna. As data collection in the vicinity of an actively erupting volcano obviously involves some safety restrictions, some sampling sites could only be visited via helicopter during routine monitoring flights by the Montserrat Volcano Observatory. The island, however, offers challenges for a gravity survey over and above mere volcanic activity.

The inner Centre Hills are overgrown by a thick rainforest with soft soils that do not provide sufficient ground stability for precise gravity measurements; while the dense vegetation itself hampers satellite-based site positioning. Moreover,

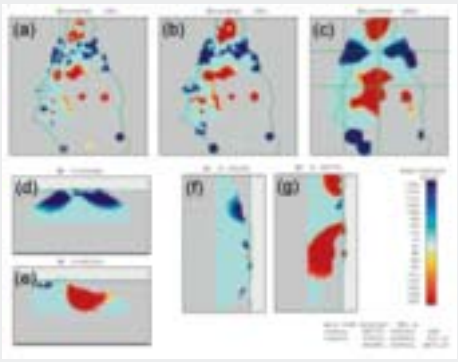
Above top: *Setup at a gravity benchmark in northern Montserrat (Silver Hills). Gravity measurements were taken using a Scintrex CG-5 Autograv, while site positions and elevations were obtained via a TOPCON Hiperpro dual frequency GNSS receiver/antenna*
Middle: *Remains of the island's capital Plymouth. Soufrière Hills Volcano is shown on the right of the picture*
Lower: *During times of increased volcanic activity and lava extrusion, the glowing lava dome is visible at night*

Left: *Pyroclastic flow travelling on the volcanic slopes towards Plymouth*

> "THE PERSISTENTLY ACTIVE SHV HAS BEEN MONITORED SINCE THE ERUPTION BEGAN, AND THE RECORDED DATA HAVE PROVIDED UNPRECEDENTED AND UNIQUE INSIGHTS"



Gravity sampling sites are given by black points in the Bouguer map. Positive density anomalies are shown in red, while negative density anomalies are shown in blue. Gravity values are relative to a base site, which is located near Gerald's in the north of Montserrat and is marked with a black cross



***Above:** Inversion results of the reduced gravity data. For full explanation please see online version*

***Left:** Topographic (left) and Bouguer (right) map of Montserrat. Inlay map shows the location of Montserrat island*

populated parts of the island can be challenging for a survey, as road conditions (not only in the exclusion zone!) render the smooth transportation of highly sensitive instruments like gravity meters difficult.

Accounting for such limitations in accessibility, a final Bouguer gravity network was established providing dense coverage (200m between adjacent sites) of the accessible regions of the older volcanic complexes. Network coverage around the active SHV is sparser, with about 1km between adjacent sites.

Data & modelling

Standard techniques were applied to correct the data for the effect of benchmark elevation (free-air effect) and latitude[3]. Correction for topographic effects was made using an automated algorithm based on a digital elevation model and bathymetric data. The resulting gravity data allowed the construction of a Bouguer gravity map of Montserrat.

The data were modelled using a non-linear inversion based on a 3D aggregation of cubic cells, which are filled in a growth process with prescribed positive and/or negative density contrasts[4]. This method provides, via an automatic approach, a free 3D geometry of anomalous bodies, which matches as much as possible the observed gravity anomalies. The sensitivity of the inversion routine for the gravity network established on Montserrat was tested and revealed an adequate representation of simulated structures to a depth of four kilometres.

Results

The collected gravity data enabled us to determine the average terrain density of subsurface rocks within the survey area. Searching for the minimum correlation between short wavelength components of both gravity and topography revealed an average subsurface rocks density of 2300kg/m^3. The best resolution of anomalous structures in the 3D modelling was obtained for density differences of ± 200kg/m^3 of rocks in the survey area.

Both the Bouguer anomaly map and the best-fit results inferred from the 3D inversion reveal high-density bodies beneath the centres of the extinct volcanic complexes in the north of Montserrat (Silver Hills, Centre Hills). In contrast, the active Soufrière Hills and the flanks of the Silver Hills and Centre Hills are low-density zones.

The high-density bodies probably represent the sub-surface extension of exposed dome rocks in the Centre and Silver Hills, while the surrounding low-density regions may represent the volcaniclastic aprons around their flanks. The gravity field around the active Soufrière Hills Volcano may be influenced by melt aggregations in the subsurface, resulting in a low density anomaly beneath the volcanic edifice. The results agree well with observations from seismic tomography[5,6]; however, the higher spatial density of the gravity network enabled me to capture small-scale features at shallow depths, such as a tectonically uplifted block (Garibaldi Hill in south west Montserrat) together with its bounding faults, and the fluvial infill of eroded valleys in central Montserrat.

Outlook

Future work will focus on the collection of 4D gravity data. A smaller network of gravity benchmarks will be occupied about once or twice a year in order to document gravity changes over time relating to mass and/or density changes in the ground. Such spatio-temporal gravity changes can result from magma movement in the subsurface, but also from groundwater migration due to changes in pressurisation of the active magmatic system at SHV. The acquired knowledge on the subsurface structure of the island (the Bouguer map) will help to identify possible pathways for subsurface fluid migration and so better quantify the crustal response to volcanically induced stresses.

Note that accounting for time-dependent gravity variations will not impact the findings presented here on the static density distribution, as temporal gravity changes in volcanically active regions are about two to three orders of magnitude smaller than the spatial gravity differences reported in the Bouguer map[7]. Finally, results from the static Bouguer survey and the spatio-temporal gravity campaigns will be combined and modelled in order to quantify poro-elastic behaviour of the crustal rocks and subsurface fluid dynamics in response to stress changes at SHV. ◆

ACKNOWLEDGEMENTS
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www.geolsoc.org.uk/geoscientist

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The Geological Society
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Lyell Meeting 2014

Deep sea chemosynthetic ecosystems: where they are found, how they work and what they looked like in the geological past

12 March 2014

The Geological Society, Burlington House

The ocean exploration in the past 40 years has revolutionised our knowledge of ecological adaptations of life in the deep sea and associated mineralogical resources. In the cold and dark ocean depths abundant animal communities flourish where fluids rich in methane, hydrogen sulphide, hydrogen and other chemically reduced compounds are released from the sea floor at hydrothermal vents and cold seeps. Similar communities occur where large pieces of organic matter, such as whales and wood, have sunk to the bottom of the sea. Life teems at these so-called chemosynthetic sites because of the huge amount of chemical energy available, and numerous symbiotic relationships of animals with chemoautotrophic bacteria. The same chemosynthesis-based communities are being increasingly recognised in the geological record, giving important new insights about the evolution of these communities through time. Part of this record comes from massive sulphide deposits, which are a significant economic resource.

This meeting will bring together geologists, marine biologists and ecologists, palaeontologists and geomicrobiologists to highlight recent achievements in our understanding of chemosynthetic ecosystems, past and present. We will explore the complex relationships between geology and life at these sites; details of chemosymbiotic animal-microbial interactions; and how and when animals adapted to life in these extreme environments. Finally, recent hypotheses about the existence of similar ecosystems on other Solar System planets will be presented.

Conveners:

Silvia Danise (Plymouth University), Crispin Little (University of Leeds)

Speakers include:

Jonathan Copley (University of Southampton) *Orbis non sufficit: going beyond biogeography in understanding the ecology of deep-sea hydrothermal vents*

Nadine Le Bris (Université Pierre et Marie Curie-Paris, France) *Intimate links between chemosynthetic fauna and their chemical environment: a microhabitat perspective*

Richard Herrington (Natural History Museum) *The economic importance of modern seafloor massive sulphide deposits and their ancient analogues*

Marina Cunha (Universidade de Aveiro, Portugal) *Ecology and biogeography of cold seep fauna, with insights from the Northeast Atlantic*

Jörn Peckmann (Universität Wien, Austria) *Biogeochemical processes at ancient and modern methane-seeps*

Jillian Petersen (Max Planck Institute for Marine Microbiology, Germany) *Chemosynthetic symbioses at vents and seeps: Tapping dark energy in the deep sea*

John Taylor (Natural History Museum) *Chemosymbiotic bivalves from the intertidal to deep sea – multiple origins, diversity and evolution*

Adrian Glover (Natural History Museum) *Chemosynthesis at whale-falls and their role in driving the speciation and evolution of annelids in the deep sea*

Steffen Kiel (Universität Göttingen, Germany) *Chemosynthetic ecosystems through Earth history*

Monica Grady (The Open University) *Astrobiological implications of chemosynthesis and the possibility of life beyond the Earth*

Further information

For further information about the conference please contact:

Naomi Newbold, Conference Office, The Geological Society, Burlington House, Piccadilly, London W1J 0BG

Tel: 0207 434 9944

Email: naomi.newbold@geolsoc.org.uk

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Field mapping – the great leveller

Image: Tom Wang / Shutterstock.com

Real mapping at BGS

Sir, Recent issues of *Geoscientist* have devoted many column inches to the need for geological mapping skills, and more recently, Desmond Donovan has questioned whether new geological mapping is needed in the UK at all.

If the process of mapping is simply to replace an existing geological map with a new one, showing more faults and more detailed stratigraphy, we'd be inclined to agree. However the skill commonly described as 'geological mapping' is really about acquiring and communicating a spatially constrained 3D understanding of the properties and structure of the geosphere, using all the field observations, subsurface data and skills at our disposal.

It is also all about understanding the events and environments of the geological past as well as those operating now and in the future, which will help us manage resources, hazards and environmental change. It is about mapping and understanding the impacts we are having and their interactions with the landscape, the atmosphere and oceans, especially in cities.

Most importantly of all, it is about working with the users of geological knowledge to ensure the delivery of environmental and economic benefits. The needs and priorities for geological mapping are driven not by a simple peer-group assessment of the quality and accuracy of existing maps, but by the gap between what we know, and what we need to know, as communicated by our clients, stakeholders and taxpayers. Those needs continue to change, so the law of diminishing returns does not apply.

In this form, geological mapping is alive and well as a skill and priority activity in BGS. We continue to recruit geologists into our onshore survey, marine, groundwater, energy and international programmes, and candidates with 'mapping' skills remain at a considerable advantage in those recruitment competitions. Computers cannot replace those skills, but they are wonderful tools for assembling and analysing multidisciplinary data sets and communicating the results of 'mapping' as maps, models and a plethora of online services, products and apps. It is true that BGS is winding down its production of traditional, lithoprinted geological maps, but this is simply because there are now alternative and increasingly diverse technologies for delivering the results of geological mapping and ensuring that the outcomes meet society's needs.

As we approach the 200th anniversary of William Smith's great map, to be celebrated by the Society in 2015, it is fitting to remember that Smith was driven by the needs of the industrial revolution. The map was the best technology at his disposal, not an end in itself.

ANDY HOWARD (SCIENCE DIRECTOR GEOLOGY AND REGIONAL GEOPHYSICS, BGS)

Real rocks

Sir, To those who deny the value of field geology I would say: field mapping is not just an intellectual exercise; it teaches you to think in 3D. This is essential training even for the exploration geologist.

I can vouch for this as, for a while, I worked for BP in the Saharan desert where, if you thought you saw an outcrop it must have been just a mirage. How else, without training gained in the field, can it be possible to reconstruct the sub-surface geology confidently, if all you have to go on is well-logs and some geophysics?

As a committed geologist, may I wish *Geoscientist* the best of luck in its crusade to save field geology from the kind of extinction that was inflicted on the dinosaurs.

DOUGLAS HELM

Sir, I have always considered that there was a link between the influence of heavenly bodies and earthquakes (water movement and the lubrication of faults) and was therefore most interested to read Alan Watsons' article Gravity & Mind (*Geoscientist* 23.10, November 2013). Is there was any evidence in the USA linking behavioural patterns of man and animals in relation to fracking?

Roger Maddrell

BGS and Society must take lead in fostering field mapping

Sir, Recent opinion on mapping in the curriculum conflates two issues: the progressive demise of field-based research and field instruction in British (not Irish) universities, and the BGS move towards phasing out the classic "1" Sheet and Memoir" in favour of a digital base from which one can order. The former is appalling. The latter, with some reservations, is to be applauded.

The Oxburgh Review in the late 1980s was a disaster for geology but not for the Earth sciences. Many excellent small departments that trained undergraduates superbly were closed in favour of larger more research-oriented departments, to the detriment of undergraduate training. This has led to the downgrading of field-based geology and mapping. Recently, a senior professor has been heard to remark that "observations at less than the scale of several kilometres are not useful in tectonics". My experience suggests that this is nonsense; tectonics depends, critically, upon fine-scale field observation.

The digitisation of data by BGS should enhance study of the British geological map by allowing print-off of any area at any scale. My only concern is that BGS field-data acquisition appears to be diminishing rapidly; perhaps BGS should collect, analyse, and synthesize geological data from multiple sources rather than relying solely upon its own diminishing field staff.

Change and evolution is critical in keeping a subject vibrant and important to society but field-based geology and its central role in industry have been hi-jacked by those with a background in physics and chemistry who seem not to understand the critical role that field observation plays in understanding the constitution and history of the Earth. Many of these folk are uneasy with something that they have not practised and do not understand. Geologists need to raise their heads above the parapet and protest against these developments. If the Geological Society of London and the British Geological Survey do not lead and promote this issue, geology in the UK is doomed. This would be sad for mining and petroleum companies who are now desperate for employees who understand the geological map, how it is made and how it can be integrated with the section, and who actually know something about Earth history.

Lastly, geology must be regarded as equal to other sciences and taught in our schools. Geology among so-called amateur organisations across Britain and Ireland is immensely popular. Like astronomy, young people love geology, especially in the field. Iain Stewart has done much to present geology coherently and brilliantly at a popular level. I hope that this is having a major effect in getting young people excited about geology and that some departments in the UK will still be teaching field-based geology when they come to university.

JOHN DEWEY

A hornet's nest

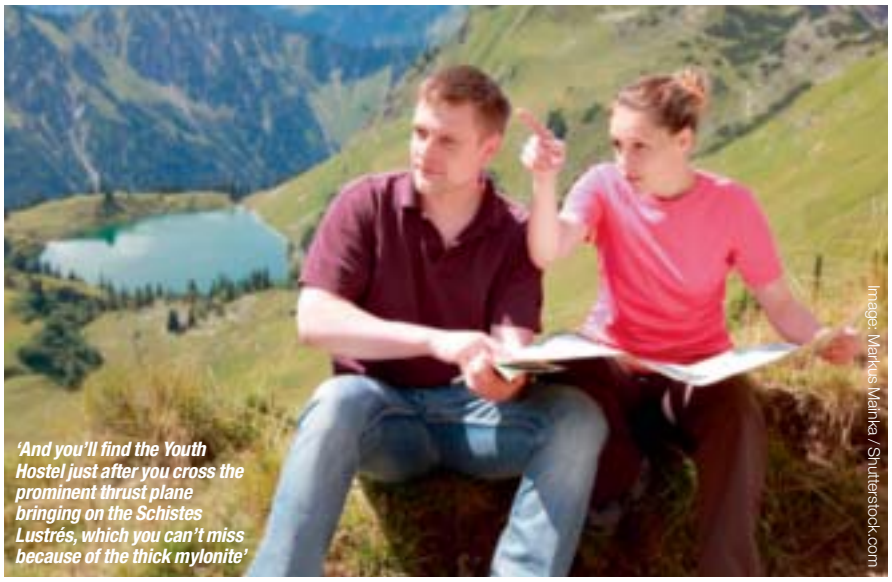
Sir, I read with interest your editorial on undergraduate mapping (*Geoscientist* 23.10 November 2013) - particularly the penultimate paragraph.

'We had been stung by bees long ago' (me too), *'but didn't make a habit of it'* (who would?), *'rarely suffered from allergies'* (not that I was aware of, until I went mapping….) *'and never went into anaphylactic shock'*.

And that is where it all went wrong for me. Stung by a hornet, I ended up in the emergency room of a hospital suffering from – er - anaphylactic shock.

My fault for choosing to map in Southern California!

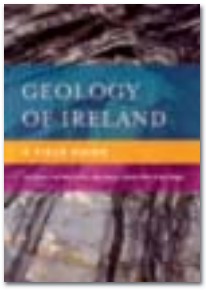
DUNCAN WADE



'And you'll find the Youth Hostel just after you cross the prominent thrust plane bringing on the Schistes Lustrés, which you can't miss because of the thick mylonite'

Image: Markus Mainka / Shutterstock.com

Geology of Ireland: a field guide



One of the big issues in geology is that of scale, and in particular how the details of the information available in hand specimen and outcrop are linked to larger scale models for the evolution of geological terrains or the continental crust. There are also increasing pressures on training field geology, and so this guide is both timely and welcome. It provides a practical and accessible introduction to the geology of Ireland distilled from many decades of student and conference field trips around the country.

The guide is in two parts, one on the broad principles of geology, with the main part as the field guide to 17 areas, mostly around the coast. The areas selected range from the oldest basement rocks in NW Mayo through a number of sedimentary localities and key igneous outcrops, and in some cases the overlying Quaternary is included in the descriptions. The geology of Ireland remains a rich heritage spanning over two billion years, and at least in the coastal and more mountainous areas, it is well exposed.

There are tantalising claims that a number of key concepts in geology were originally developed and tested in Ireland, without the space to provide the supporting evidence! Juxtaposing a brief introduction to the principles of geology and the details of the field geology in the different areas also highlights a series of questions around how the specific evidence from outcrop informs larger scale regional models. The geological record is far from complete and in many ways it offers a biased and perhaps not very representative record. How we infer the nature of natural processes from the rock record, and what aspects are best developed and tested in the field, remain at the core of these discussions.

Each of the 17 field trips described includes a summary of the local geology, a list of background reading and an estimate of the duration and the likely conditions underfoot. They are clearly laid out with good quality colour photographs and clear summaries of the outcrops and suggested interpretations. The rocks range from high grade basement gneisses and granites, to volcanic rocks and associated mineralisation, and detrital and calcareous sediments ranging in age from the Cambrian to the Carboniferous. It is both an excellent introduction to the field geology of Ireland, and an indication perhaps of the geological controls on the delights of the Irish landscape.


Killarney National Park, Ireland

Image: Kwiatek7 / Shutterstock.com

Reviewed by ***Chris Hawkesworth***

GEOLOGY OF IRELAND: A FIELD GUIDE
PATE MEERE, IVOR MACCARTHY, JOHN REAVY, ALISTAIR ALLEN & KEN HIGGS, The Collins Press, Cork, (2013) 372pp. ISBN-13: 9781848891661
List price: £17.99 www.collinspress.ie.

World Mineral Production 2007-11

The latest in the BGS series *World Mineral Production* lists 73 mineral commodities over the five year period 2007-11 continuing a dataset stretching back to 1913. Clearly, and reflecting the current world economic climate, production has remained relatively flat during 2011 as compared with the previous year, the largest growth being in zirconium and lithium minerals. The former is up 23% with the largest producers being Australia (762,000 tonnes) and South Africa (383,000t.) (cf. world production 1,612,000t.). Again, world tonnage of lithium minerals was up by 21% with the estimated world total lithium content of 24,600t, and where the major source again was Australia with a total production of 421,228t. of spodumene.

Not surprisingly, iron ore and crude petroleum production have both increased by 15% and 14% respectively. Since 2008 iron production ceased in the UK with the demise of the small Florence Mine in Cumbria after the working of a few hundred tonnes per annum of high grade haematite for foundry uses, mineral specimens and jewellery (prior to abandonment the mine served as a local tourist attraction via a potentially hazardous Inclined drift!). Again, the working of fluorspar ceased in 2011.

The 'rank' of 'King Coal' is, despite environmental controversy, still increasing - so that including brown coal and lignite, world production has now reached 773 billion tonnes. Over the five-year period covered, UK annual output has shown an insignificant rise to 18,492,000t. (*cf.* a peak of 287,000,000t. in 1913). Alarmingly, natural gas, the UK's most important source of indigenous energy, has over the five-year period declined by 38%.

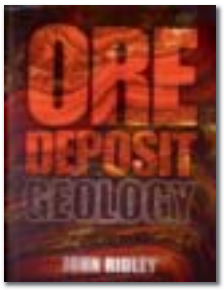
Confusingly, a country's actual mined production of many metals may be expressed in metal content as distinct from the refined and smelter contents, listed separately. Thus while the 2011 mined output in China is 1,299,300t, the total smelted and refined production is given as 8,277,200t, which presumably reflects an immense import trade.

The publication is of obvious interest to numerous disciplines and will be of particular appeal to economists, industrialists and the mining and geological professions.

Reviewed by ***Iain A. Williamson***

WORLD MINERAL PRODUCTION, 2007-2011
BROWN T J *et al.* British Geological Survey, 2013, 76pp, ISNB 978-0-85272-757-7
List price: £30.00 www.bgs.ac.uk

Ore Deposit Geology



The science of ore-forming processes is extremely complex and multi-disciplinary, involving a mix of structural geology, geophysics and geochemistry unique to each individual deposit. Perhaps due to this multidisciplinary nature, few good, comprehensive textbooks exist.
Ore Deposit Geology by John Ridley is a new offering, and represents an excellent and comprehensive textbook for advanced undergraduates, postgraduates or professionals.

As with many ore deposit textbooks, the book starts with an introduction to the definitions of ore deposits, a few pages on global demand for different metals, and some basic definitions. This section is not especially detailed, but is well explained and provides context for the rest of the text. Following this, the book is split into five chapters focusing on magmatic, magmatic-hydrothermal and orogenic, hydrothermal, sedimentary and supergene ore forming processes. Chapters contain an excellent level of detail, and normally include several case studies for each type of deposit.
For advanced readers who find themselves to be covering familiar ground, each chapter ends with a reference list full of both classic papers, and many very recent publications.

The book has been developed by the author from course materials aimed at advanced undergraduate and postgraduate students. As such, the subject matter is dense and complex, with familiarity with magmatic processes and geochemistry being assumed. That said, concepts are introduced gradually, to avoid overwhelming new students. Chapters vary considerably in length to reflect the breadth of the topics: the shortest (supergene ores) is only 18 pages, while the longest (magmatic-hydrothermal ores) is a colossal 146 pages.

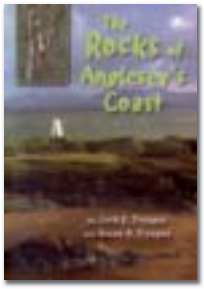
In general this text is fantastic, though I have one or two minor criticisms.
The images used to support the text are all black and white line drawings. In places, especially in maps and cross-sections showing case studies, these can be difficult to understand, due to their small size.
A dash of colour would have made some of the images much easier to interpret. Likewise, colour photographs of examples of ore deposits and alteration facies would be a nice addition, microscope images, whether reflected or transmitted light, are conspicuous by their absence.

Overall however, this is among the best ore-deposit textbooks on the market. The strength of the book lies in its clear descriptions of ore-forming processes, equal emphasis on different sides of the discipline (geochemistry, structural geology, etc.), and comprehensive supporting references. Highly recommended.

Reviewed by ***Murray Hoggett***

ORE DEPOSIT GEOLOGY
JOHN RIDLEY, Published by: Cambridge University Press. 398pp. ISBN 978-1-107-02222-5
List price: £40.00 www.cambridge.org

The Rocks of the Anglesey Coast



Few would disagree with this book's opening comment that Anglesey offers a greater variety of geology than any other area of comparable size in the British Isles. As a guide to this geology, this work by two very experienced and highly respected geologists succeeds well within its explicit aims, to assist and inform the 'casual' geologist in the understanding of the more easily accessible parts of the Anglesey coastline.

Two excursions away from the coast, to the Marquess of Anglesey's Column (blueschists) and Parys Mountain (once the largest producer of copper in the world) are excusable. Otherwise, the selection of excursions is uncontroversial: e.g., the exclusion of the spectacular exposures of thrusting around Carmel Head (excluded, perhaps on grounds of accessibility) and similarly the interesting (but often complex) traverse from Point Lynas to Dulas Bay. Less understandable is the exclusion of the interesting Lower Carboniferous conglomerates and the Lligwy Bay Disturbance which are so well-exposed on the south side of Lligwy Bay[1] - these surely could have been added to Excursion S.

The guide starts with a summary of the geology of the island and ends with a short but informative glossary, both of which should serve the target readership well. The standard of production is high with good quality heavyweight paper and a clear typeface. The well-crafted and very readable text is free of errors and typos and is supplemented by numerous colour photographs of good quality (number 3 of Excursion A, on page 26, is an exception, but it was taken in the notoriously murky woods around the base of the The Marquess of Anglesey's Column!).
The maps are variable in both character and quality, sometimes uninformative and, to my eyes, often too small. However, they are generally adequate for their intended purpose. There may be worries about the field durability of the glue-bound paperback binding – I would prefer the ring-bound format, as used in the senior author's earlier field guide[2].

The average reader of *Geoscientist* might bemoan the lack of both critical discussion of some of the more controversial exposures and of a comprehensive reference list. They might prefer the earlier work referred to above[2]. Also, some (but not I) might gripe at the emphasis given to structural geology. However, one might well excuse this, given the well-known interests of the authors.

Reviewed by ***Trevor F Emmett***

References - 1) Bates, D E B and Davies, J R 1981. *Geologist's Association Guide No. 40: Anglesey.* The Geologist's Association, London. **2)** Treagus, J E 2008. *Anglesey Geology - A Field Guide.* GeoMôn. ISBN 0-9546966-2-X www.geomon.co.uk

THE ROCKS OF ANGLESEY'S COAST
TREAGUS, J E AND TREAGUS, S H 2013, Published by: Gwasg Carreg Gwalch, . A5, 191pp, 124 colour photographs, 15 maps and line drawings. ISBN 978-1-84524-209-1 (pbk). **List price: £7.50. www.carreg-gwalch.com**

BOOKS Available for review

Please contact **ted.nield@geolsoc.org.uk** if you would like to supply a review. You will be invited to keep the review copy. See a full up-to-date list at **www.geolsoc.org.uk/reviews**

- **NEW! The Dolaucothi Gold Mines - Geology & Mining History** (99pp), and **Dolaucothi Gold - a vision realised** (200pp), by Alwyn Annels & Barry Burnham, and Alun Isaac respectively. APECS Press (both) 2013. sbk. These two titles are offered together for joint review at 400 words.
- **NEW! Seismic Data Analysis Techniques in Hydrocarbon Exploration** by Enwenode Onajite. Elsevier 2013 237pp hbk.
- **NEW! Geochemical Rate Models - an introduction to chemical kinetics** by J Donald Rimstidt. Cambridge University Press 2013 232pp hbk.

PEOPLE *NEWS*

CAROUSEL

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

◆Ruth Allington

Ruth Allington, consultant engineering geologist, and Joint Senior Partner at GWP Consultants LLP, has been named one of the 'top 100 inspirational women in mining'. Ruth works in mineral resource evaluation, geological modelling, and the detailed design and scheduling of quarries and open pit mines for construction materials and industrial minerals in the UK and internationally. She has served on the Society's Council, as Professional Secretary, and as President of the European Federation of Geologists.

◆ Liv Carroll

Liv Carroll, Associate Director of Geology and Business Development at Wardell Armstrong International, has been named one of the 'top 100 inspirational women in mining'. Her job is split equally between technical work and business development, and as a Chartered Geologist with an MSc in Mineral Project Appraisal, she regularly undertakes investment due diligence and fatal flaw studies for exploration and mining companies, banks, investment funds and individuals.

◆ Laurance Donnelly

Laurance Donnelly (Wardell Armstrong International) has received two prestigious international awards for Forensic Geology. The Geological Society of London's Forensic Geoscience Group (FGG) Award was present 'In recognition of his pivotal role in global forensic geology and in gratitude from the group for its formation'. The Russian Federal Centre of Forensic Science (Ministry of Justice, Moscow, Russia) presented its award 'In appreciation of his significant global contributions to forensic geology and soil forensics'.

◆Dave Rothery

Dave Rothery has been awarded a personal Chair in Planetary Geosciences at the Open University. Dave was formerly Senior Lecturer in Earth Sciences at the OU.

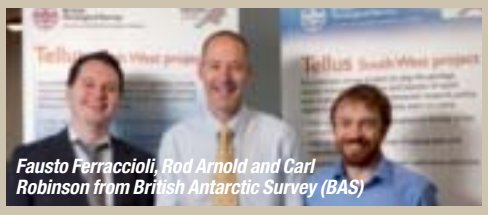
◆Malcolm Hart

Malcolm Hart (Emeritus professor of Micropalaeontology, School of Geography, Earth & Environmental Sciences, Plymouth University) attended the inauguration of the Global Stratotype Section & point (GSSP) for the base of the Turonian Stage on 25 October 2013. The event was held at Pueblo, Colorado, as part of the Annual Meeting of the Geological Society of America, which is celebrating its 125th Anniversary this year.

Geology? Tellus more!

Tellus South West, will provide scientific data on South West England, writes **Sonia Cassidy**

Professor Iain Stewart and Dr Andrew Howard



Fausto Ferraccioli, Rod Arnold and Carl Robinson from British Antarctic Survey (BAS)

It will expand knowledge of geology, landscapes and ecosystems, help manage risks from natural hazards such as flooding, landslides and radon, and provide a census of the current state of the environment for measuring impacts of future change. The project is an initiative of BGS, British Antarctic Survey (BAS), and the Centre for Ecology and Hydrology (CEH), working with Camborne School of Mines (CSM) at the University of Exeter.

A conference on the subject held at the Eden Project last October was attended by representatives from local government, heritage groups, environmental research partnerships, minerals companies, agriculturalists and university researchers from across the region. Delegates were treated to a first glimpse of the project's new survey data, including new, highly accurate, 3D maps of the landscape and the physical, chemical and mineral properties of the underlying soil and geology. Numerous opportunities for follow up research and information products were highlighted.

➤ The Tellus South West project is due to be completed next month (March 2014). For more information visit the project website at **www.tellusgb.ac.uk**

Hodgson memorial donation

A specimen of *Cheirolepis trailli* has been unveiled on the East Staircase's upper landing, Burlington House, in memory of Dr Alan A Hodgson, the gift of his family.

Pictured with the President, Mr David Shilston (left) and President Designate Prof. David Manning (right) are (left to right) Rosie Mathiesen (daughter), Roy Mathiesen, Kieran Williams (widow) & Tony Hodgson (son).

Geoscientists in the news and on the move in the uk, europe and worldwide

DISTANT THUNDER *Ladies' man*

As geologist and science writer Nina Morgan* discovers, first impressions do not necessarily reveal all

The private life of Henry de la Beche (1796-1855), the first Director of what is now the British Geological Survey, was more tangled than most. Having inherited an estate in Jamaica on the death of his father in 1801, De la Beche - young, handsome, and in possession of a considerable fortune - settled in Lyme Regis with his mother and her third husband in 1812. He soon became a great favourite among the young ladies in Lyme - a fact immortalised in an anonymous poem, *The Lymiad*, or *Letters from Lyme to a friend in Bath by a Unknown Gentlewoman*.

A copy of the original publication, now in the collection of Lyme Regis Museum, consists of a series of eight letters all in verse, about the town of Lyme and it inhabitants as they were in 1818. De la Beche, a yacht-owner and keen sailor, was one of the many inhabitants featured - under an assumed name, of course!

Whether coincidence of not, in the same year that the Lymiad appeared, De la Beche succumbed to charms of - and married - Letitia Whyte (1801-1844), daughter of Captain Charles Whyte of Loughbrickland, Co. Down, Ireland. Their daughter Elizabeth, known as Bessie, was born in 1818. But the marriage was not a success. De la Beche went on a solo trip to Jamaica to attend to estate business in November 1823, and on his return discovered that Letitia had left him for another man.

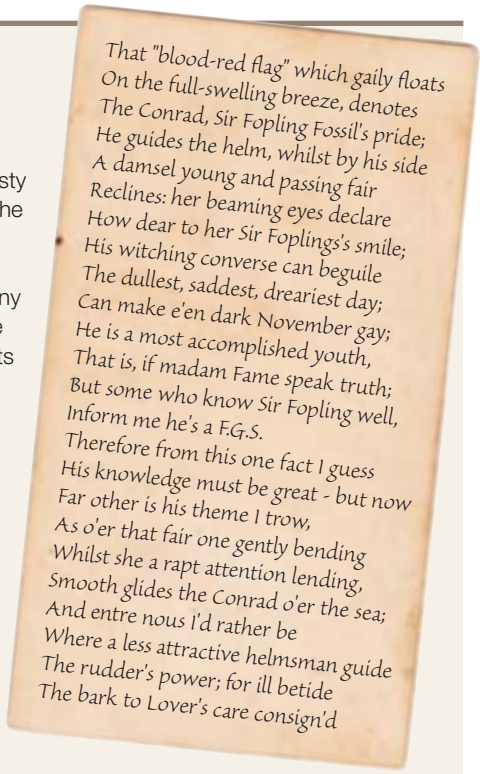
Unhappy union

In 1825 Letitia requested a legal separation on the grounds that "*the union proved to be of the most unhappy nature: the treatment which Lady De la Beche received at the hands of her husband being such as to render it impossible for her to live with him.*" The pair were divorced in 1826, and Letitia went to live with Major-General Henry Wyndham, an illegitimate son of the Earl of Egremont.

For his part, De la Beche admitted to 'hasty expressions' and said he 'ought to have trusted entirely [her] own high sense of honour in many cases'. But a footnote to The Lymiad suggests another reason for the marriage breakdown. This describes De la Beche as:

"*...a very F.G.S. I have since understood is this famed youth. He is married, and his love-tales are forgotten. Talk of anything besides an Ichthyosaurus, an Ornithorhynchus paradoxus or a Pentacrinite and the youthful geologist will take a comfortable nap in his chaise-longue.*"

Perhaps Letitia had a point. Surely having to play a constant second fiddle to a dinosaur in your husband's affections is enough to sour any marriage - unless, of course, the wife is a palaeontologist herself!



That "blood-red flag" which gaily floats
On the full-swelling breeze, denotes
The Conrad, Sir Fopling Fossil's pride;
He guides the helm, whilst by his side
A damsel young and passing fair
Reclines: her beaming eyes declare
How dear to her Sir Foplings's smile;
His witching converse can beguile
The dullest, saddest, dreariest day;
Can make e'en dark November gay;
He is a most accomplished youth,
That is, if madam Fame speak truth;
But some who know Sir Fopling well,
Inform me he's a F.G.S.
Therefore from this one fact I guess
His knowledge must be great - but now
Far other is his theme I trow,
As o'er that fair one gently bending
Whilst she a rapt attention lending,
Smooth glides the Conrad o'er the sea;
And entre nous I'd rather be
Where a less attractive helmsman guide
The rudder's power; for ill betide
The bark to Lover's care consign'd

Acknowledgement
Sources for this vignette include *New insights into the early life of Henry Thomas De la Beche (1796 - 1855)* by Tom Sharpe, which is included as the introduction to the booklet A journal of Sir Henry de la Beche, Pioneer Geologist written in his own hand, edited by Richard Morris and published by the Royal Institution of South Wales, 2013 (ISBN 978-0-956378446), and from which the lines from *The Lymiad* relating to Henry de la Beche used here are quoted. Other sources include *Henry de la Beche: observations on an observer* by Paul. J. McCartney, Friends of the National Museum of Wales, Cardiff, 1977 (ISBN 0 7200 0201 X); and the websites: **www.lymeregis museum.co.uk/in-the-museum/the-lymiad** and **www.austenonly.com/2010/03/21/news-of-the-lymeiada-poem-about-regency-lyme-regis/**

***Nina Morgan** geologist and writer based in Oxford

IN MEMORIAM WWW.GEOLSOC.ORG.UK/OBITUARIES

THE SOCIETY NOTES WITH SADNESS THE PASSING OF:

Blackburn, James Kirk *
Bowler, Christopher Michael Lance *
Chapman, W T *
Holroyd, J D *
Hudson, Neal F C *
Jacqué, Maurice *
Jones, Brian Lloyd *
Leckie, George Gallie *
Middleton, John *
Miller, James *
Million, Ronald *
Moffatt, William Stewart *
Murchison, Duncan G
Robson, Geoffrey Robert *
Spencer, Peter Murray *
Spurr, Arthur M M*
Williams, Colin L *

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 (*). The symbol § indicates that biographical material has been lodged with the Society.

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**.

OBITUARY DAVID GWYN ROBERTS 1943 -2013

Distinguished oceanographer and oil explorer, with a global structural and tectonic view

Professor David Roberts, quintessential oceanographer, geoscientist, oil explorer, author, teacher and mentor to many in the geoscience community, died on 5 July 2013. He is survived by his wife Elizabeth (Robin), and daughters Suzanne, Nikki, Elizabeth, Ross and Tracie and six grandchildren. David had a variety of nicknames - Dave, the Prof., DGR, Tiger - reflecting the deep affection, gratitude and respect of his co-workers. He was a world expert in marine geology, tectonophysics and petroleum geology with an encyclopaedic knowledge and deep understanding of basins, their processes and evolution. His influence and impact on our thinking and understanding in these areas were profound.

WELSHMAN

A proud Welshman, David was born in 1943 in Welshpool. He received a BSc in Geology from the University of Manchester. After mapping volcanoes in the East Indies, he joined the National Institute of Oceanography, researching the structural and stratigraphic evolution of Continental Margins. This culminated in the seminal work with Lucien Montadert (IFP) elucidating the origins of Rockall and Biscay and subsequently their new ideas on the stretching of continental crust during rifting. In 1979 David received a Doctorate of Science in recognition of his work on passive margins.

In 1981 David joined BP, who recognised the value his basin knowledge and understanding would bring to their global exploration activities. For the next 22 years he had an enormous impact in helping develop its reputation as a successful leading explorer. His roles included Head of Basin Analysis, Deputy Chief Geologist and ultimately Distinguished Advisor in Exploration, BP's highest technical leadership role. Perhaps his greatest achievement and lasting legacy will be the generations of geoscientists he trained and inspired – bringing his encyclopaedic knowledge, basin frameworks and insight to every problem.

David continued to publish, promote research and play a leading geological academic role chairing/co-chairing major conferences; playing an active role in societies (AAPG Regional President for Europe (2001-2003) and Chairman EAGE Petroleum Division (2000-2001) and advisory panels to governments. He was also Honorary Fellow and Visiting Professor at Royal Holloway College, University of London (2001), Visiting Professor at the IFP and Senior Research Fellow at Southampton's Oceanography Centre.

HONOURS

David authored many scientific articles and books including being founder and editor in chief of the journal *Marine and Petroleum Geology*. He was internationally recognised through honorary memberships in the AAPG and GSA. From the AAPG he received Certificates of Merit in 1995 and 1998, Distinguished Service Award (1997) and the R H Dott Memorial award in 1998. He was awarded the Petroleum Medal (1999) and the prestigious Coke Medal by the Geological Society of London in 2005 (picture).

In 2003 David retired from BP and became a highly successful exploration consultant, working with a range of companies, board roles at Premier Oil, GeTech and Medserv as well as teaching numerous courses. David also continued to work on regional Geology; in 2011 he co-authored *The Western Alps, from Rift to Passive Margin to Orogenic belt* and more recently his Magnus Opus, *The Regional Geology and Tectonics of the World*.

David was a great friend and colleague to many, with a deep passion for life, a legendary encyclopaedic knowledge and a love of geology. His impact and influence will continue through the great works that he has published but more importantly through the hearts, minds and knowledge of the many geologists both young and 'more mature' that he has inspired through the years.

Written by **Mike Bowman** with contributions from **Elizabeth (Robin)** and **Nikki Roberts** and **Bob Stephenson**. A longer version of this obituary may be read online

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.

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

ENDORSED TRAINING/CPD

COURSE	DATE	VENUE AND DETAILS
Forcing & Predictive Models of Change	17 - 21 February	Consideration of future forcing of geomorphological processes and landform change are essential for modelling and quantifying hazard and risk. University of Sussex, Sussex House, Brighton. **Cost:** £1229. Fellows 10% discount. **Contact:** Dr John Barlow **E:** john.barlow@sussex.ac.uk
Lapworth's Logs	n/a	'Lapworth's Logs' is a series of e-courses involving practical exercises of increasing complexity. **Contact:** info@lapworthslogs.com. Lapworth's Logs is produced by Michael de Freitas and Andrew Thompson.

DIARY OF MEETINGS FEBRUARY 2014

MEETING	DATE	VENUE AND DETAILS
Chartership Evening West Midlands Regional	11 February	**Speaker:** Dr Bill Gaskgarth. **Venue:** Lapworth Museum. **Time:** 1800 for 1830. **Contact:** Daniel Welch **E:** geolsoc_wmrg@live.co.uk
Glossop Award Hong Kong Regional	18 February	**Venue:** City U, Kowloon Tong. **Time:** 1830 for 1930. **Speaker:** Jim Griffiths (Chair, EGGS). **Contact:** Kitty Chan **E:** kitty.chan@arup.com
Oil & Gas in the Arctic Geological Society London lecture	19 February	**Venue:** Janet Watson Lecture Theatre, Burlington House. **Speaker:** Dr Al Fraser (Imperial College). A London Lecture. See advert on p.6 **Contact:** Naomi Newbould **E:** naomi.newbold@geolsoc.org.uk
Incoming: Learning to Love the Meteorite North West Regional	20 February	**Speaker:** Ted Nield. **Venue:** Liverpool John Moores Lecture Theatre 137. **Time:** 1800 for 1830. **Contact:** Nik Reynolds **E:** NReynolds@coopers.co.uk
Annual Joint Meeting Geologists Association Southern Wales Regional	22 February	**Venue:** Swansea. Talk tbc. **Time:** 1030 for 1100. Free. **E:** swales.rg@geolsoc.org.uk
Advances in Terrain Mapping and Analysis for Landslide Hazard Assessment Hong Kong Regional	22 February	Conference. **Venue:** The Hong Kong Polytechnic University. **Time:** 0830 – 1730. **Contact:** Bob Sas c/o Fugro (Hong Kong) Ltd. 7/F, Guardian House 32 Oi Kwan Road Wanchai Hong Kong **T:** +852 2894 5729 **F:** +852 9777 3894 **E:** bsas@fugro.com.hk or Kitty Chan **E:** kitty.chan@arup.com
Water Framework Directive & Hydrogeology, Yorkshire Regional	26 February	**Speaker:** Dr Sarah Mackay, WSP. **Time:** Evening, tbc. **Venue:** Leeds, tbc. **Contact:** Alex Keech **E:** Yorkshireregionalgroup@gmail.com

OBITUARY PETER ALFRED ZIEGLER 1928-2013

Outstanding regional geologist who integrated tectonics, stratigraphy and petroleum geology

Peter Ziegler Hon. FGS, died 19 July 2013, aged 84. An outstanding regional geologist, his work spanned large parts of the globe, most notably Western and Central Europe and the North Atlantic Region, and influenced companies, governments and universities almost equally.

> HE WILL BE REMEMBERED BY ALL HIS FRIENDS AND COLLEAGUES AS A VERY GIFTED, HIGHLY MOTIVATED AND TRULY INSPIRATIONAL GEOLOGIST

He was born in Wintherthur, Switzerland on 2 November 1928. He completed his PhD at the University of Zurich in 1955 and joined Shell Canada in 1958, where he was involved in exploring the Cordilleran foothills of British Columbia, Northwest Territories and Yukon, and the Alberta Devonian reef play.

SHELL

In 1970 he transferred to Shell International in the Netherlands when his involvement in Northwest Europe, for which he will be chiefly remembered, began. A long series of papers on the geology of Northwest Europe culminated in the publication by Shell of the *Geological Atlas of Western and Central Europe*, (1982, considerably expanded in 1990) - a benchmark publication integrating tectonics, basin evolution, stratigraphy and petroleum geology.

This work provided the foundation for the development of Northwest Europe into one of the world's foremost hydrocarbon provinces. Ziegler's regional syntheses provided an early shared framework that allowed petroleum geoscientists, not only in Shell but in other oil companies and in academia, to build on a common understanding, with the result that Northwest Europe is now one of the best documented hydrocarbon provinces in the world. This is in no small degree due to his pioneering work, which has provided an example, and set standards, for similar studies elsewhere.

Subsequently he produced two equally impressive publications on the *Evolution of the Arctic-North Atlantic* and the *Western Tethys* (1988) and the *Evolution of Eurasia* (1989).

DAY JOB

All who worked with him appreciated his wealth of geological knowledge, freely shared; he was also a mentor and inspiration to many younger geologists. What is not generally realised is that, although fully supported by Shell, much of the work for his publications was done in his own time, while holding down a demanding and high profile "day-job".

He retired from Shell in 1988 but continued a very active geological career, publishing widely in international journals and thematic volumes on the processes controlling extensional and compressional intraplate tectonics and on the evolution of the lithosphere. In 1992 he was appointed Honorary Lecturer at the University of Basel and in 1996 as Titular Professor for Global Geology.

He was elected Fellow of the Geological Society in 1978 and made Honorary Fellow in 1983. In 1988 he received the William Smith Medal and in 1992 gave the William Smith Lecture on *Plate-moving mechanisms: their relative importance*. He was also honoured by the AAPG, the Belgian Geological Society, the Royal Geological and Mining Society of the Netherlands, the Geological Society of Glasgow, the Geosciences Union, the German Geological Society and the Russian Academy of Natural Sciences.

He will be remembered by all his friends and colleagues as a very gifted, highly motivated and truly inspirational geologist.

Written by **Howard Johnson, Bruce Levell** and **John Parker**

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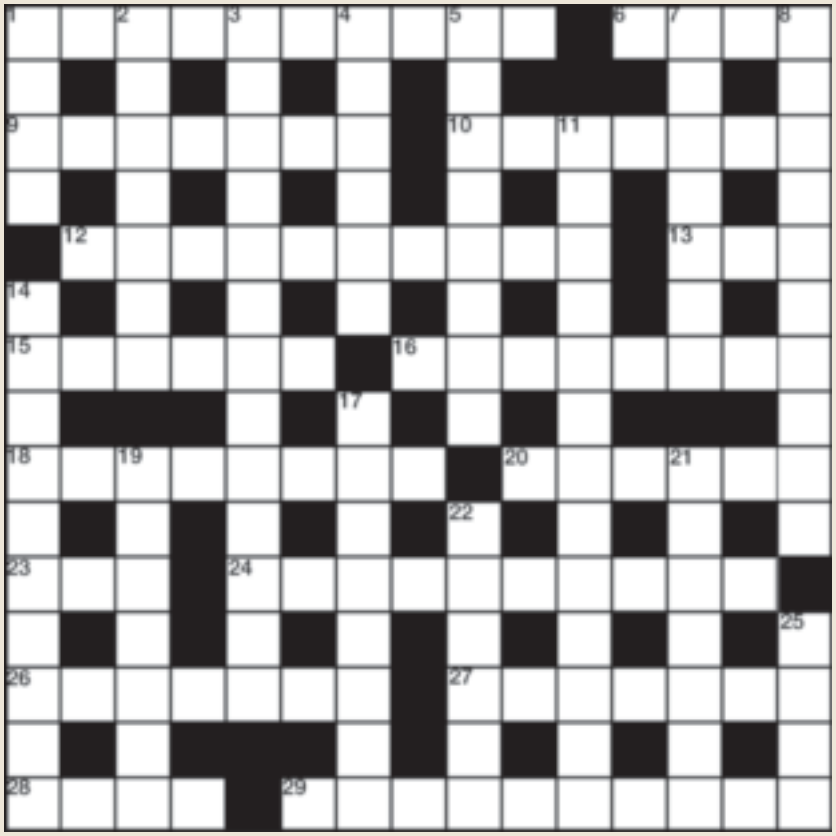
CROSSWORD NO.176 SET BY PLATYPUS



ACROSS

1 Compiler's epithet (6-4)
6 State containing Arches, Bryce Canyon, Canyonlands, Capitol Reef, and Zion national parks (4)
9 SI derived unit of electric charge (7)
10 Luminous and flickering, as a Bunsen flame with the airhole closed (7)
12 Added limbs (10)
13 It's only human to (3)
15 Witty answer, for a chemist (6)
16 Sediment colouration, as when iron is oxidised (8)
18 As opposed to the Tragedies (8)
20 Pertaining to the south American mountain chain (6)
23 Atom with an excess of negative or positive charge (3)
24 Design drawings (10)
26 The Elder Pliny saw it destroyed just before succumbing himself (7)
27 Aligns according to compass bearings (7)
28 It's not only geologists who like to dig this salacious deposit (4)
29 US federal highways (10)

DOWN

1 *Leuciscus leuciscus* (4)
2 Soggy British pancake-like confection riddled with vertical holes(7)
3 May be broken down by natural processes of decay (13)
4 Freudian term referring (broadly) to sexual urges (6)
5 First of Virgil's three major works (8)
7 In the thing referred to (7)
8 In radio transmission, a new frequency created by combining or mixing two frequencies in a nonlinear signal-processing device (10)
11 Comes up with the wrong name (13)
14 Arm-footer (10)
17 A mistaken belief; collective noun for the working assumptions of management (8)
19 A molecule that may bind chemically to others to form a polymer (7)
21 Baltic state between Latvia and Russia (7)
22 What the Prince of Denmark believes one must do to end troubles (6)
25 Sea-girt land (4)

WIN A SPECIAL PUBLICATION!

The winner of the November Crossword puzzle prize draw was Gordon Taylor of Battlebarrow.

All correct solutions will be placed in the draw, and the winner's name printed in the April 2014 issue. The Editor's decision is final and no correspondence will be entered into. **Closing date - 24 February**.

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 .....

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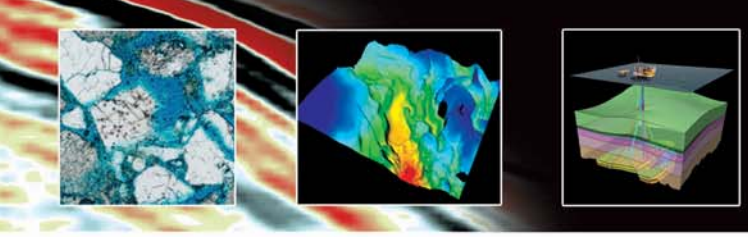
Postcode .....

SOLUTIONS NOVEMBER

ACROSS:
1 Serpentine **6** Talc **9** Cameral **10** Tsunami **12** Endogenous **13** Dee **15** Elapse **16** Seasonal **18** Anglesey **20** Falcon **23** Air **24** Ornamented **26** Infidel **27** Alberta **28** Eden **29** Asymmetric

DOWN:
1 Sick **2** Romania **3** Edrioasteroid **4** Teller **5** Nitrogen **7** Abandon **8** Chiselling **11** Unsustainable **14** Metabasite**17** Reynolds **19** Giraffe **21** Clearer **22** Embalm **25** Laic



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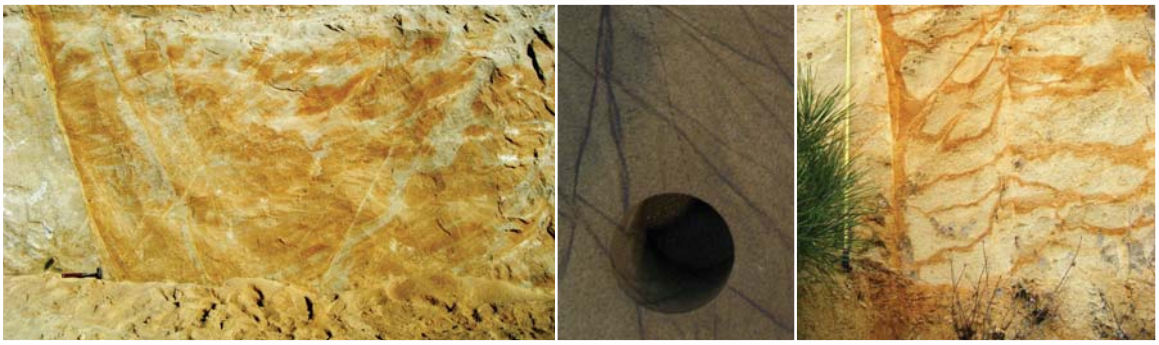
Call for Abstracts Deadline: 25 April 2014

Small to Subseismic Scale Reservoir Deformation

29-31 October 2014

The Geological Society, Burlington House, Piccadilly, London



Convenors:

Mike Ashton
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Small to subseismic deformation features can negatively impact reservoir performance and/or be stimulated to enhance field recovery. In many cases such features are controlled by, or interact with, similarly scaled sedimentological features, complicating conventional views of intra-reservoir connectivity and flow unit definition. Whilst the intra-reservoir distribution of these small-scale features has traditionally been 'modelled' in the subsurface by applying data from analogue outcrop studies, the recent advances in the acquisition and processing of both seismic and imaging techniques, such as helical CTscans, have provided greater resolution of the 'subsurface' than ever before.

This 2-day international conference will bring academic and industry geoscientists and engineers together, to examine: (i) how much extra geological detail modern seismic and imaging techniques are now able to provide; (ii) how that expansion of detailed information is being approached and captured by interpreters - and tied back to real reservoir geology; (iii) what 'new questions' are now being asked of outcrop and well based studies in order to address the 'unseen challenges' of subseismic deformation; (iv) how this is influencing the level of detail that should be captured to define better subsurface flow characteristics within flow simulation models; and (v) how depletion and injection impact upon formation and reactivation of reservoir scale deformation features.

Call for abstracts:
Please email paper and poster contributions to laura.griffiths@geolsoc.org.uk
and copy to mikeashton@badleyashton-america.com by 25 April 2013.

For further information please contact:
Laura Griffiths, The Geological Society, Burlington House, Piccadilly, London W1J 0BG.
Tel: +44 (0)20 7434 9944 Fax: +44 (0)20 7439 8975

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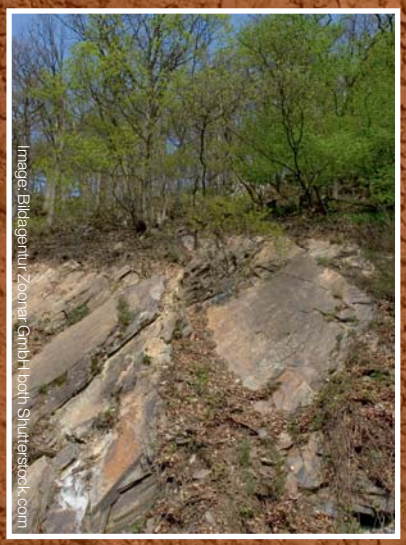
2015 YEAR OF MUD

In 2014, Council will launch a Science Strategy for the Geological Society



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An exciting new initiative for delivery of this strategy is to plan 'themed years', around which the more proactive aspects of the Society's forward science programme will be planned. The theme for each year will be cross-cutting, and will bring together both fundamental curiosity-driven science and instances of societal problems where geology has a vital role to play. We will aim to focus at least one Society flagship conference on the selected theme each year, with input from Specialist Groups who wish to be involved, and we are also inviting Specialist Groups and others to plan their own meetings and activities. We also anticipate publishing thematic sets of journal papers, and organising educational, policy and outreach activities relating to each year's theme.

Council has decided to make 2015 a 'Year of Mud' at the Geological Society!

There is a resurgence of interest in the science of mud-rocks, driven by a wide range of factors including:

- Shale gas, and the need to improve our understanding of pore behaviour and permeability
- The challenges of tunnelling in clay in major projects such as Crossrail
- The search for suitable geological host rocks for the disposal of radioactive waste
- Slope stability, urbanisation and development of megacities
- Diminishing soil quality
- Increasing flood risk as mud is washed into city storm water drains
- Advances in nanogeoscience and biogeology

We would welcome your suggestions for mud-related conferences and other activities, either through the Specialist Groups or from individual Fellows. We will keep the Fellowship informed about plans for the Year of Mud, and hope you will want to get involved.

Get involved!

To suggest a meeting topic or activity, or to find out more, please email Georgina Worrall
E: georgina.worrall@geolsoc.org.uk

Image: Hywit Dimyadi / Shutterstock.com