GEOSCIENTIST

VOLUME 28 No. 06 ◆ JULY 2018 ◆ WWW.GEOLSOC.ORG.UK/GEOSCIENTIST

The Fellowship Magazine of the Geological Society of London

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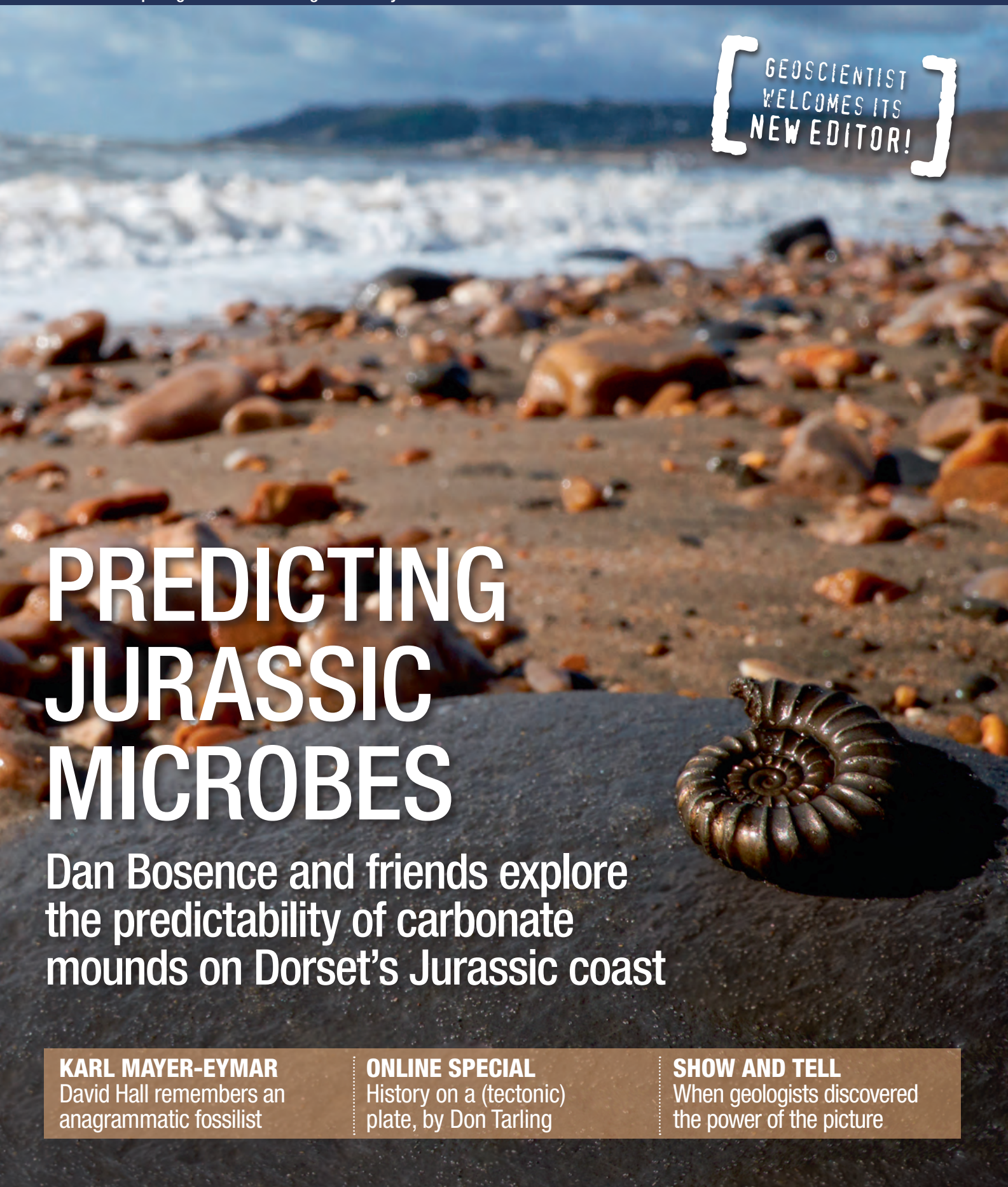

GEOSCIENTIST WELCOMES ITS NEW EDITOR!

PREDICTING JURASSIC MICROBES

Dan Bosence and friends explore the predictability of carbonate mounds on Dorset's Jurassic coast

KARL MAYER-EYMAR
David Hall remembers an anagrammatic fossilist

ONLINE SPECIAL
History on a (tectonic) plate, by Don Tarling

SHOW AND TELL
When geologists discovered the power of the picture

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2019 YEAR OF CARBON

Themed years are at the heart of the Society's science strategy. Throughout 2019 the Society will explore the geoscience of ***Carbon*** through research conferences, lectures, our education programme and other activities.

Carbon is one of the most important elements of our planet. In the oceans and atmosphere, carbon has important consequences for the global climate system. Complex organic molecules led to life on Earth. Carbon-based energy resources remain of critical importance, both in terms of extraction and mitigation of carbon emissions, but also for planning for a future carbon-neutral society.

Carbon is central to a number of critical societal challenges. Understanding the carbon budget of our planet over long timescales requires quantification of the cycling of carbon between surface reservoirs and Earth's deep interior. On shorter timescales, complex feedbacks exist between the precise nature of our orbit around the Sun, the biosphere and solid Earth. Over the last century, the rapid increase in atmospheric CO_2, caused by the burning of fossil fuels, is one of the greatest scientific challenges of our time, and will occupy generations to come.

Carbon-based fuels, however, remain essential for our economy, transport, communications and everyday life. Petroleum geoscience develops innovation in exploration, in extraction and in mitigating emissions. In the future, however, a move to carbon-neutral fuels and energy sources is unavoidable, and is the focus of much research, including studies in the field of carbon sequestration.

The ***Year of Carbon*** is an opportunity to showcase both academic and applied research focussing on energy, geochemical cycling, climate and materials, among many others. Events throughout the year will involve academe, industry, economists and government bodies, as well as partner geoscience societies and organisations. We welcome proposals for meetings and events aimed at a range of audiences to bring into focus the myriad of ways carbon underpins life on Earth.

Get Involved!

Find out more at www.geolsoc.org.uk/carbon19

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

Geoscientist is the Fellowship magazine of the Geological Society of London

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Century One Publishing
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ART EDITOR
Heena Gudka

DESIGN & PRODUCTION
Ryan Gaston

PRINTED BY
Century One Publishing Ltd.

ISSN (print) 0961-5628
ISSN (online) 2045-1784

Subscriptions: All correspondence relating to non-member subscriptions should be addresses to the Journals Subscription Department, Geological Society Publishing House, Unit 7 Brassmill Enterprise Centre, Brassmill Lane, Bath, BA1 3JN, UK. Tel: 01225 445046. Fax: 01225 442836. Email: sales@geolsoc.org.uk. The subscription price for Volume 28, 2018 (04 issues) to institutions and non-members will be £157 (UK) or £179 / US$358 (Rest of World).

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ON THE COVER:
10 PREDICTING JURASSIC MICROBES

It's more an art than a science with body fossils - but might microbial mounds yield to forecasting?

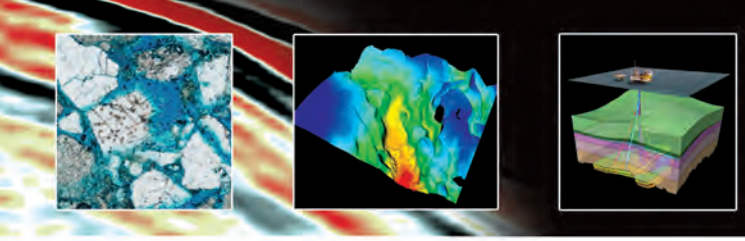
FEATURES

REGULARS

ONLINE SPECIAL

PERSPECTIVES ON PLATE TECTONICS

DON TARLING TAKES ISSUE WITH THE HISTORICAL ACCOUNT OF PLATE TECTONICS PUBLICISED BY THE SOCIETY IN ITS PROMOTION OF THE MCKENZIE ARCHIVE



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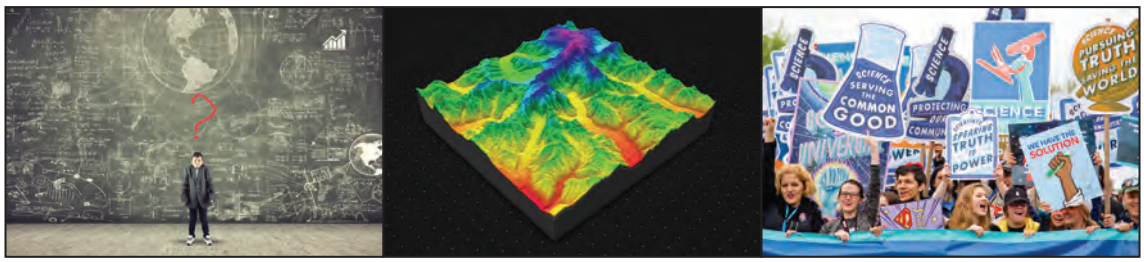
Communicating Geoscience: Building Public Interest and Promoting Inclusive Dialogue

4 September 2018

The Geological Society, Burlington House, Piccadilly, London



Engaging with the public to communicate geoscience can be fraught with difficulties, with explanations of complex subsurface concepts and the use of scientific terminology often alienating those we seek to engage with. This is especially true in communication from the energy industry regarding its activities, products and role in society, which can inspire a passionate and often polarised reaction.

There is often mistrust towards science and a bias towards industry, including those working in academia who undertake industry-funded research. Accompanying this is the targeted manipulation of fact and theory, which has led to the rise of “fake news” and a greater scrutiny of both business and individual interests. While this can make science communication challenging and frustrating, engaging with the public can be rewarding and is a key tool to build trust, dispel myths and provide up-to-date scientific knowledge to the public.

This one-day conference aims to look in-depth at geoscience communication in the energy industry to better achieve effective public engagement. This includes evaluating lessons learned from case studies, establishing best practice and understanding the value and importance of public perception. Speakers have been invited from both industry and academia and represent a range of disciplines, including oil & gas exploration, carbon capture & storage, shale gas, geothermal energy and social science.

To further explore themes of communication, we plan to live stream sessions to virtual delegates in order to reach a wider audience. The conference will conclude with a panel discussion and a drinks reception to facilitate networking.

Convenors:

Kirstie Wright
Heriot-Watt University

Anna Clark
Heriot-Watt University

John Argent
Sound Energy Plc

Invited Speakers:

Iain Stewart
Plymouth University

John Underhill
Heriot-Watt University

Lisa Rebora
Equinor

Hazel Gibson
Plymouth University

For further information please contact:

Sarah Woodcock, The Geological Society, Burlington House, Piccadilly, London W1J 0BG.
Tel: +44 (0)20 7434 9944 or email: sarah.woodcock@geolsoc.org.uk

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> GEOSCIENTIST WILL REMAIN A FORUM FOR COMMUNITY DISCUSSION – FEEL FREE TO SPEAK UP

FROM THE EDITOR'S DESK:

A diversity of voices

Hello there, readers. Please allow me to introduce myself as the new Editor of *Geoscientist*. I am honoured and thrilled to take over this role from Ted Nield. Over the past 20+ years, together with fantastic Editorial Board members and Chief Editors, including current Chief Editor Peter Styles, Ted has built *Geoscientist* into the stimulating and informative publication we know today. Thank you, Ted, for all your hard work. The magazine is cherished by Fellows, and you will be sorely missed.

Clearly, I have big shoes to fill. Initially trained in the environmental sciences, I segued into geophysics, geology and sedimentology during my postgraduate and postdoctoral years. But it was the communication of science, rather than its practice, that really motivated me; so eight years ago I moved into scientific publishing.

As an editor at *Nature Geoscience*, my days have been consumed by the trials of peer review, interspersed with the more light-hearted tasks of commissioning, editing and writing news content. Now, under the safe stewardship of our incoming Chief Editor, Andy Fleet, and the Editorial Board, I'm excited to help shape the future of *Geoscientist*.

In coming weeks, I will spend much of my time focusing on the 'how' – specific tasks I must learn in order to deliver a magazine every month. But, in doing so, I won't forget the 'why'. I have thought a lot about what *Geoscientist* and the Geological Society stand for, their purpose, and the value they bring to our community.

Going forward, I want to ensure that *Geoscientist* retains a vibrant mix of science, opinion and news. The Fellowship should view this magazine as a valuable resource, with scientific articles that stimulate thinking within and beyond one's own specific field. The magazine will remain a go-to place for keeping up with events and activities of the Society and the broader geoscience community in the UK and abroad. Importantly, *Geoscientist* will continue to provide a voice for the whole community.

Mounting pressures on the natural environment mean that geoscience has never been more relevant, diverse or interdisciplinary. Scientists across the geoscience fields are working together with social scientists, economists and policy-makers to tackle issues of climate change, escalating demand for natural resources, and the need to sustain an ever-growing population on an increasingly polluted planet. The fabric of the geoscience community is changing, and *Geoscientist* will reflect and foster that change. The voices in our pages should mirror the diverse nature of the problems we tackle – I encourage readers from all backgrounds to get in touch.

DR AMY WHITCHURCH, EDITOR - amy.whitchurch@geolsoc.org.uk @geoscientistmag

SOCIETY NEWS

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

TRUSTEES LIST

Trustees of The Geological Society of London 2018-2019

Every year following elections the Trustees list of the Society, printed on the magazine's masthead, changes. This event usually goes unremarked, but this year we thought we would give the event greater prominence by repeating the new list of Council and Officers here in Society News. Trustees give greatly of their time and effort in representing the Fellowship, and surely deserve a vote of thanks.

Prof Nicholas Rogers (President)
Mr Thomas Backhouse
Mr Andrew Bloodworth
Mr John Booth (Vice President)
Dr Jason Canning
Ms Lesley Dunlop
Mr Graham Goffey (Treasurer)
Dr Sarah Gordon (Secretary, Foreign & External Affairs)
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Prof Katherine Royse (Secretary, Professional Matters)
Mr Keith Seymour (Vice President)
Miss Jessica Smith
Dr Helen Smyth
Prof Robin Strachan
Mr John Talbot (Vice President)
Dr Alexander Whittaker (Secretary, Science)

Future meetings: Council & OGMs

OGMS: 2018: 4 July, 18 September, 28 November. **2019:** 6 February, 3 April
COUNCIL: 2018 4 July, 18 & 19 Sept (residential), 28 November.
2019: 6 February, 3 April

Awards 2019 – make your nominations!

Fellows of the Society are encouraged to submit nominations for the Society's Awards for 2019 to the Awards Committee. Full details of how to make nominations are on the website at **W: www.geolsoc.org.uk/About/Awards-Grants-and-Bursaries**. Nominations must be received at the Society no later than 28 September 2018.
Stephanie Jones

PUBLIC LECTURE SERIES

Making the most of minerals: sustaining society sustainably?

Speaker: Simon Redfern, University of Cambridge
Date: Wednesday 26 September

Programme

- **Afternoon talk:** 14:30pm Tea & Coffee: 15:00 Lecture begins: 16:00 Event ends
- **Evening talk:** 17:30 Tea & Coffee: 18:00 Lecture begins: 19:00 Reception.

Further Information

Please visit **www.geolsoc.org.uk/gsllondonlectures18**. 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: **Sarah Woodcock,** The Geological Society, Burlington House, Piccadilly, London W1J 0BG,
T: +44 (0) 20 7432 0981 E: **receptionist@geolsoc.org.uk**

Society Discussion Group

Meetings of the Geological Society Discussion Group (formerly the Geological Society Club) are 18.30 for 1900, when dinner is served. Attendance is open to all members of the Society. For up to date information concerning topics for discussion and speakers, please go to W: **bit.ly/2qlhMtu**.

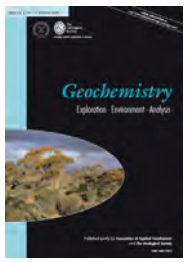
- Wednesday 19 September - Burlington House
- Wednesday 24 October – Bumpkins
- Wednesday 5 December – Athenaeum

Please contact Sarah Woodcock for more information and to make a reservation.
E: **sarah.woodcock@geolsoc.org.uk**

Latest news from the **Publishing House**

Jenny Blythe has the latest from the Geological Society Publishing House

Scott Wood, Dean of Science and Mathematics at North Dakota State University, has been appointed Chief Editor of *Geochemistry: Exploration, Environment, Analysis* (GEEA), from 1 August 2018.



➤ Scott Wood's editorial is available in the Lyell Collection:
http://geea.lyellcollection.org/content/18/2/95

MMI partial extraction geochemistry for the resolution of anthropogenic activities across the archaeological Roman town of Calleva Atrebatum

By Graham C. Sylvester, Alan W. Mann, Samantha R. Cook and Clare A. Wilson

Sixty three soils samples, fourteen samples of previously excavated archaeological material, and five background soil samples taken at the Silchester Roman Town of Calleva Atrebatum in the County of Hampshire, United Kingdom were analysed by the Mobile Metal Ion (MMI) method for a total of fifty three elements. Samples from within the town walls showed considerably higher concentrations than samples outside for many elements; Au, Ag, Cu and Sn were in extremely anomalous concentrations, Bi, Cd, Hg, Mo, P and Pb were anomalous and Sb and Zn in elevated concentrations. The overall pattern of element distribution is one of an annulus of higher elemental concentrations surrounding a centre of generally lower values centred on the previously excavated...continue reading in the Lyell Collection

➤ Read full abstract and paper in the Lyell Collection
http://geea.lyellcollection.org/content/18/1/58

The Weeks Formation Konservat-Lagerstätte and the evolutionary transition of Cambrian marine life

By Rudy Lerosey-Aubril, Robert R. Gaines, Thomas A. Hegna, Javier Ortega-Hernández, Peter Van Roy, Carlo Kier and Enrico Bonino

The Weeks Formation in Utah is the youngest (c. 499 Ma) and least studied Cambrian Lagerstätte of the western United States. It preserves a diverse exceptionally-preserved fauna that inhabited a relatively deep-water environment at the offshore margin of a carbonate platform, resembling the setting of the underlying Wheeler and Marjum formations. Yet, the Weeks fauna differs significantly in composition from the other remarkable biotas of Cambrian Series 3 of Utah, suggesting a significant Guzhangian faunal restructuring. This bioevent is regarded as the onset of a transitional episode in the history of life, separating the two primary diversifications of the Early Palaeozoic. The Weeks fossils have been strongly affected by late diagenetic processes, but some specimens still preserve exquisite anatomical details.

➤ **Read more here http://jgs.lyellcollection.org/content/early/2018/05/18/jgs2018-042**

Economies of truth

Where public policy is concerned, beware institutional lies and follow the money, says **Ted Nield***

Remember when they said they were cutting the 'second post'? And remember what happened? Yes, that's right. They actually did away with first post, and now we have to wait until after lunch for our mail.

The same sorts of 'institutional lie' frequently attend changes to education. Widespread and justifiable concern about the standard of education offered to pupils once sent to 'Secondary Modern' schools ended with the end of selective secondary education and the creation of Comprehensives. Alas, in poorer catchment areas, the result was that the escape route of education that had formerly been available to a few, was abolished. They said they were abolishing second best, but instead they abolished access to the best.

Open plan

Then came 'open plan schools'. 'Comprehensivization' demanded new buildings to accommodate much larger institutions ('economies of scale'). Obviously, internal walls are expensive, so as with other pseudo-egalitarian measures like non-selective secondary education - and the swiftly-abandoned absurdity that was 'mixed-ability teaching' - 'studies' were generated to demonstrate that housing several classes in one cavernous space would prove better for everybody. No teachers were asked, needless to say.

One of the main supposed – and in the end illusory - benefits of comprehensivization was that once its sunlit uplands were attained, minority subjects hitherto only available to the select would become available to all. But alas, without the concentrating effect of selection, which ensured that minority subjects could at least attract small numbers in small institutions, in some catchments, even very large comprehensives failed to do so. Minority subjects started instead to disappear, from all except schools in relatively well-off areas – the exact reverse of what was promised. The process continues today as comprehensive catchments, and the resulting house-price segregation they create, further perpetuate economic privilege.

Post-16 education

All post-16 education within schools is now problematic. It is cheaper to make FE colleges cater for everybody, run A-level courses there instead, and bus pupils in. One of those 'minority subjects' is geology. And one of those 'schools in relatively well-off areas' is none other than Cardiff's Whitchurch High – which has won the Schools Geology Challenge in Wales for the last four years and became UK champions in 2017.

Whitchurch has a very large - and diverse - sixth form, with over 400 pupils; but this has not saved it. Instead, funding has been cut by nearly 20% in six years – and by £255,000 this year, which Joyce Slack, chair of governors, described in a BBC interview as "a shock". Which is why this year, she told the BBC: "We've had to cut some key areas such as geology where we're felt to be sector leading." She is not wrong. Geology at WHS is almost legendary.

There is nothing inherently wrong with non-selective secondary education, and much to be said for it. But, like modern architecture, it can't be done well on the cheap. First, they came for music, and we said nothing. You know how the rest of it goes.

*** Dr Ted Nield** former Editor of Geoscientist, comes from a long line of schoolteachers and is only writing this because nobody else did (see sidebar!).

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 **amy.whitchurch@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).

> "WHITCHURCH HAS A VERY LARGE - AND DIVERSE - SIXTH FORM, WITH OVER 400 PUPILS; BUT THIS HAS NOT SAVED IT"
>
> DR TED NIELD

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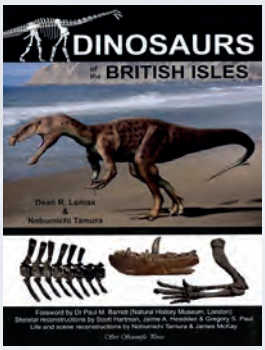
Regional Geology Books and Guides

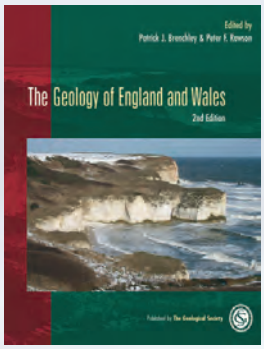
Dinosaurs of the British Isles



This book is truly unique, providing the first comprehensive account of the dinosaurs of the entire British Isles. It will be of interest to a broad audience, from academics to those with a general interest in fossils.

View more at: www.geolsoc.org.uk/MPDIN

The 'Geology of' Series



These regional geology titles appeal to a broad audience, from amateurs and professionals visiting a region on their holidays, to researchers and engineers needing an overview of an area they are planning to work in.

View more at: www.geolsoc.org.uk/GEOGIFTS

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View more at: www.geolsoc.org.uk/BEDROCKUK

View more online at: www.geolsoc.org.uk/geogifts

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Image credit: Glencoe © Brent Bouwsema

ARE JURASSIC MICROBES PREDICTABLE?

Dan Bosence, Peter Burgess, Arnaud Gallois, Estanislao Kozlowski, Ian Billing and **Bernie Vining**

explore the predictability of carbonate mounds on Dorset's Jurassic coast and its implications for petroleum exploration and production

Are Jurassic microbes predictable? Why would you want to know?

For many years there has been limited academic research into microbialites; however, their time has come! The giant oil discoveries offshore Brazil in the last decade have resulted in a renaissance of interest into how microbial communities construct microbialites, and how we might predict their genesis, distribution and character as oil reservoirs.

This has significant implications for the petroleum life-cycle from exploration through development to production. For example, in offshore Brazil in excess of 50 billion barrels have been discovered in what have been interpreted as microbialite reservoirs. There is further potential in other parts of the world: e.g., on the conjugate margin in West Africa. The drilling of each well can cost upwards of US$ 150M. Better prediction of microbialites will have major economic consequences.

Setting the scene

Currently, microbialite mounds, unless stacked one upon another, may not be resolvable on seismic data. In addition, there is only limited core material, given the possible geographic extent of the play. Is this core material representative? How would the perceived potential of the play be influenced by drilling through a highly productive microbialite mound, in contrast to drilling through the relatively low producibility of the inter-mound facies? If the latter were drilled first, would there be any incentive to continue exploring for mound reservoirs?

> FOR MANY YEARS THERE HAS BEEN LIMITED ACADEMIC RESEARCH INTO MICROBIALITES; HOWEVER, THEIR TIME HAS COME!

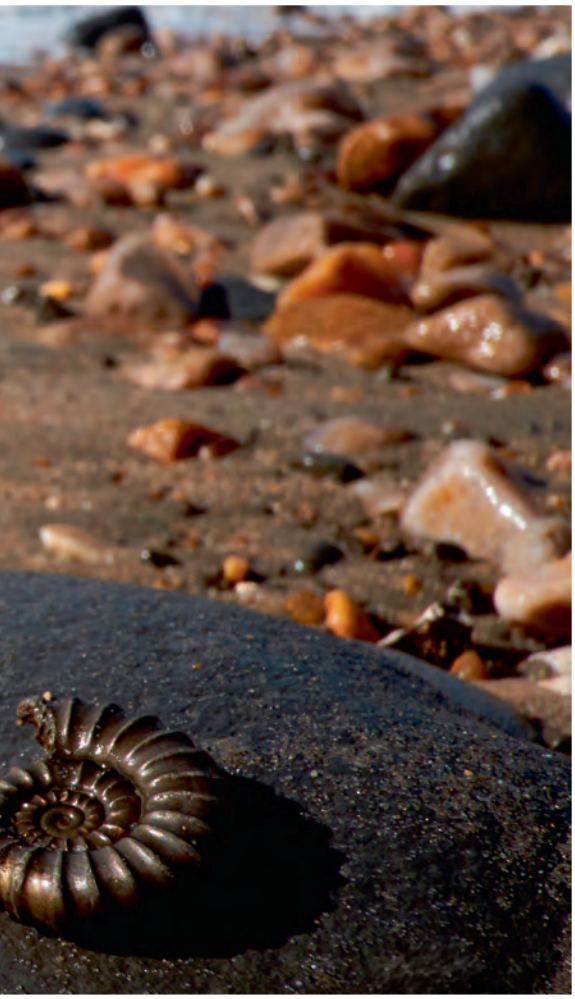

Fig. 1. The "Modelling Mesozoic Microbialites" team in quarry exposure on Isle of Portland. Left to right Dan Bosence (RHUL), Peter Burgess (formerly RHUL), Bernie Vining (formerly Baker Hughes), Estanislao Kozlowski, Arnaud Gallois (RHUL) and Ian Billing (formerly BP)

In exploration, having an understanding of the environment of deposition and the distribution of facies within a time-slice is critical. Can a map be constructed to show the distribution and size-range of the microbialite mounds in a lateral sense? What are the controls on their location, concentration and growth? In addition, using a sequence stratigraphic approach, what are the vertical stacking patterns; aggradational, progradational, retrogradational?

Lateral and vertical variations in facies have a profound effect on reservoir continuity and connectivity. In field development, a better understanding of microbialite distribution and characterisation can enable the optimal location and spacing of these expensive wells and, in some cases, reduce the number of wells drilled. In production, this acquired knowledge may be applied to well planning; deviated, S-shaped and horizontal well-designs to target the highly productive mound facies. There are many unanswered questions and many challenges!

An approach, and a possible answer to some of these questions is to 'go back to the rocks'. Detailed field outcrop studies, integrated with state-of-the-art numerical forward modelling techniques, have provided some new insights into microbialite predictability. This was the catalyst for the recent research at Royal Holloway, University of London sponsored by Baker Hughes and BP (Fig. 1).

Field-based studies

Our research has established that the lowest units of the Purbeck Limestone Group (Mupe Member) are characterised by microbial mounds that occur in three cycles, or depositional sequences, each separated by an emergent soil horizon or paleosol (Fig. 2; Gallois *et al.*, in press). Together these are locally known by their traditional quarrying terms as 'Caps' and 'Dirt Beds' respectively. The absence of marine fossils, primary evaporites and freshwater algae indicate that these accumulated in brackish lakes on the western margin of the Wessex Basin.

The paleosols and their fossil trees, extensively studied by Jane Francis, formed forested landscapes around the Purbeck lakes and were flooded in three periods of lake expansion. Brackish-water tufas (microbialites) formed around the bases of trees, or independently from trees, and these form the nuclei to microbial mounds, up to four metres thick and 20m across.

The tufas are complex vuggy lithologies but are principally constructed by thrombolites (microbial limestones ▶

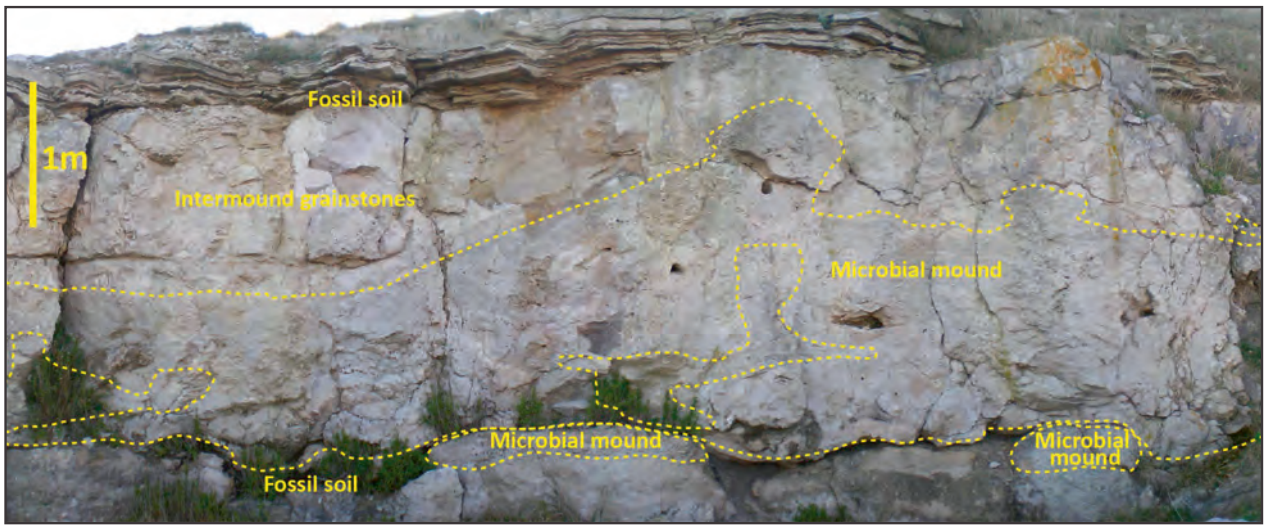

Fig. 2: Quarry facies like this one (Isle of Portland) allow facies to be mapped out in 2-D and lateral and vertical facies relations to be studied. The microbialite mounds are bounded, bottom and top, by paleosols and constructed mainly by thrombolites that nucleated on trees and branches (preserved as cylindrical holes in quarry face)

Fig. 3: Thrombolites are the major mound-building facies and preserve a large amount of primary framework porosity. Here, partially filled with geopetal sediments (centre of picture) and later fringe cements (23mm coin for scale)

▶ with a clotted texture) with minor stromatolites, but also invertebrate burrow boundstones that form initially around the trees. This unusual facies is formed of peloidal muds that are bound by burrow walls to form collars around the trees. Microbial filaments trap, bind and cement the locally produced peloidal, skeletal and intraclastic grains to form a framework that is itself cemented by early calcite cements.

Framework pores are partially filled with internal sediments and early cements (Fig. 3). The resulting microbialite preserves a large amount of original primary porosity, which makes such lithologies of interest as potential reservoir rocks. Surrounding intermound areas accumulated rudstones, grainstones and packstones comprising

Fig. 4: Rare examples of extensive bedding plane exposures provide valuable evidence for plan-view shapes of mounds; their sizes and spacing. East Point, Lulworth Cove. Here, the upper surface of the Hard Cap mounds are partially exhumed on the bedding surface dipping to the foreground. The upper cliff comprises the Broken Beds, currently widely regarded as an evaporite collapse breccia

peloids, intraclasts and skeletal fragments (ostracods and molluscs) in moderate-energy, shallow, lacustrine waters.

Following lake flooding and mound growth, lake level fell and the deposited limestones were subjected to subaerial erosion to form a microkarstic surface. This represents the sequence boundary prior to the development of the next paleosol (lowstand and transgression) and the overlying microbialite bearing sequence. The close association of microbial mounds with soils indicates that they formed in shallow lacustrine settings.

Brackish waters are inferred by the absence of *in situ* primary evaporite minerals and also freshwater algae (Charophyta) and by the presence of brackish-water molluscs and a mixed-salinity ostracod assemblage. The sulphate evaporites of the Purbecks (well known through the work of Ian West) are now accepted to occur after the earlier brackish-water phase that contains the microbialites.

Numerous natural cliffs and quarry sections expose 2-D vertical sections through these classic outcrops and a small number of outcrops show plan views of the mounds, illustrating elliptical to circular morphologies (Fig 4 - online). However 3-D outcrops are largely absent.

3D from 2D

Visualising 3-D morphologies and sizes of the mounds, and their possible connectivity, is challenging because of the 2-D nature of the outcrops. This aspect is commonly of importance in palaeoenvironmental analysis but also when assessing such structures as hydrocarbon reservoirs in the subsurface.

> TO ESTABLISH THE BASINAL SETTING FOR THE ACCUMULATION OF THE PURBECK LIMESTONE, WE NEED BOTH SUBSURFACE AND OUTCROP DATA

Two approaches have been used.

Firstly, Lidar surveying of vertical quarry faces and outcrops has provided data on shapes and sizes of mound and intermound areas in 2-D vertical cross-sections and in a number of different orientations. These confirm that the mounds have irregular, interfingering relations with intermound sediments and that there are no preferred shapes or orientations of the mounds. Secondly, static modelling has been undertaken in Petrel to reconstruct mound distribution in 3-D when constrained by adjacent 2-D quarry faces of varying orientations (Fig. 5 - online). This allows us to predict the likely arrangement of mounds, and their connectivity in 3-D.

While there are no known precise analogues for these brackish-water mounds, some western Australian coastal lakes have similar, small thrombolite buildups in a 'Mediterranean' climate setting (e.g. Lake Clifton). However, Laguna Bacalar in Yucatan, Mexico has more similar microbial mounds and relationships between mounds initiating around trees and subsequent soil development - albeit in a freshwater setting (Fig. 6 - p15).

The combination of outcrop-based data on facies, their vertical and lateral relationships, 3-D visualisation and the Laguna Bacalar analogue have all been used by Gallois *et al*. (in press) to erect a new facies model for the accumulation of the lowest part of the Purbeck limestones (Fig. 7). This provides a qualitative prediction for the establishment of microbial mounds in shallow lacustrine settings.

Sub-surface data

To establish the basinal setting for the accumulation of the Purbeck Limestone, we need both subsurface and outcrop data. Because of the hydrocarbon prospectivity of the Wessex Basin, a large amount of seismic data exists (albeit of variable vintage and quality). ▶

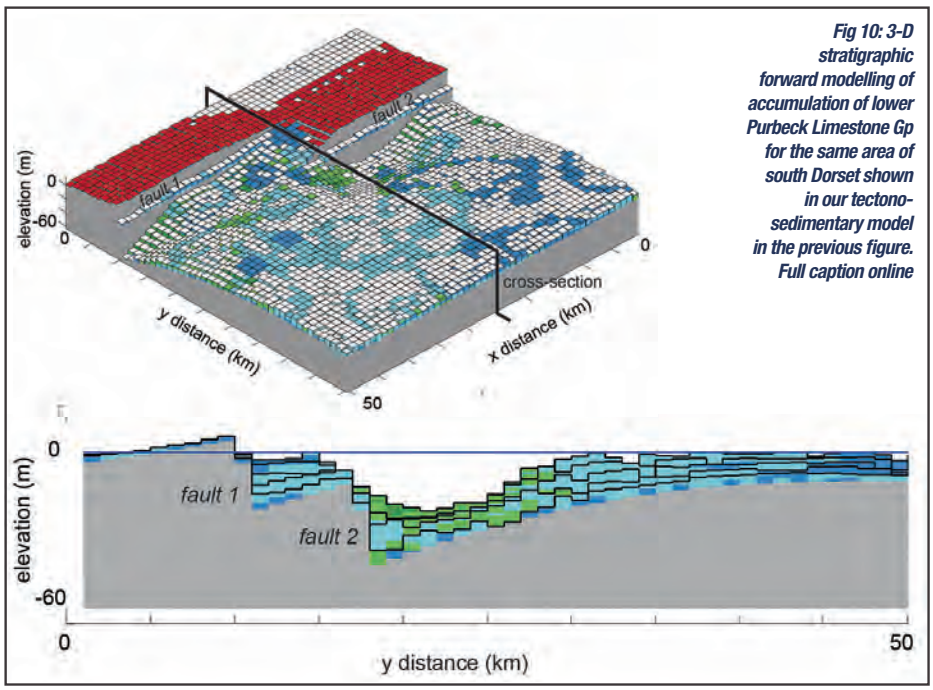

Fig 10: 3-D stratigraphic forward modelling of accumulation of lower Purbeck Limestone Gp for the same area of south Dorset shown in our tectono-sedimentary model in the previous figure. Full caption online

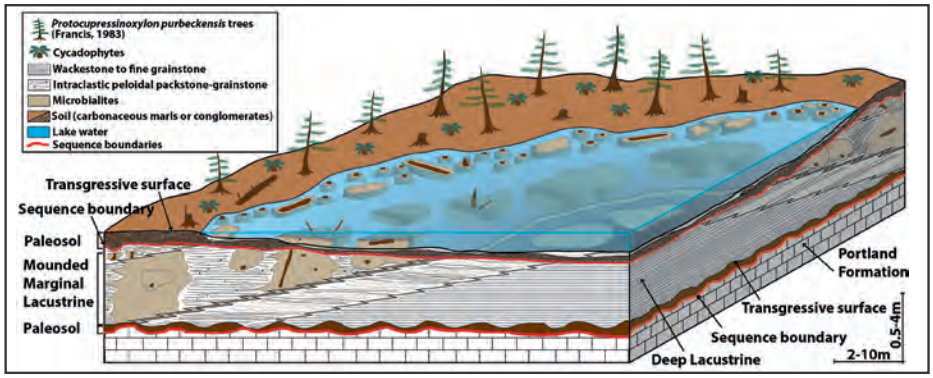

Fig 7 (right): 3D Facies model for microbial mounds of the L. Purbeck Limestone Group accumulating between two emergent soil horizons. Trees assisted in mound development by providing localised relief and hard substrate for microbial mound growth

▶ These data indicate that the Purbeck Limestone Group accumulated in, and is now preserved within, hangingwall sub-basins to the south of the E-W oriented Purbeck-Wight and the Ridgeway faults that were subsequently inverted during Cenozoic compression.

Formation tops, tied to well data, identified in N-S oriented seismic sections indicate that strata thicken progressively from the footwall to hangingwall sub-basin sites, thus indicating the Late Jurassic extensional movement on the major E-W faults (Fig. 8 - online). This evidence confirms the syntectonic setting of the Purbeck Group and the existence of E-W elongate lakes in the hangingwall areas to the extensional faults - as proposed earlier by Underhill.

The facies model has been integrated with isopachs and traces of active extensional faults so that facies can be displayed on a palaeogeography of the study area in a tectono-sedimentary model (Fig. 9 - online). An example is given for the main microbial mound-bearing unit, the Hard Cap. This shows thicker strata near the centre of the Ridgeway fault and thicker and shallower waters with microbial mounds to the south of the relay ramp between the Ridgeway and the Purbeck faults.

Relay ramps are expected to be favourable sites for carbonate sediment accumulation, as they provide extensive areas for areas of shallow-water for carbonate production. In addition, greater concentrations of dissolved carbonates would be supplied to the lake waters through drainage channels funnelled through the ramp from the carbonate-rich footwall area undergoing erosion at this time. The location and NE – SW orientation of this shallow area is similar to that interpreted previously by Townson and by West as a 'swell' that influenced accumulation of the Portland and Purbeck limestones.

Forward modelling

An independent approach to the problem of predicting where facies will occur is through forward numerical modelling. Process rates taken from modern depositional settings and fault-related subsidence are used to simulate carbonate stratigraphies in successive, geologically realistic time-steps. This allows us to bridge the gap between detailed outcrop-based observations and facies models with larger, basin-scale reconstructions. The 3-D modelling of sedimentary and tectonic processes, and the ability to interrogate multiple-scenario simulations, enables us to recognise the relative importance of the major controlling parameters in tectono-sedimentary models (Fig. 10 - online).

A modified version of **Carbo-CAT** (Burgess, 2013) was used to study the growth, erosion and redeposition of microbialites as controlled by supply of dissolved carbonates, depth-related microbial carbonate production with varying hydraulic energy, subsidence rates, lake level changes and a fault-related topography. The 3-D model illustrated (Fig. 10) is based on the same study area in south Dorset as our tectono-sedimentary model (Fig. 9).

Predominant elements include the two extensional faults, the erosional footwall and the hangingwall depocentre and the relay ramp. Modelled strata are compared with stratigraphic logs from the same location to compare the thicknesses and broad facies classifications (*in situ*-produced versus transported microbial facies) in order to determine model parameters that best replicate observations.

The object of this exercise is to not only to find a good match, but also to understand the effect that different model parameters have on the resulting

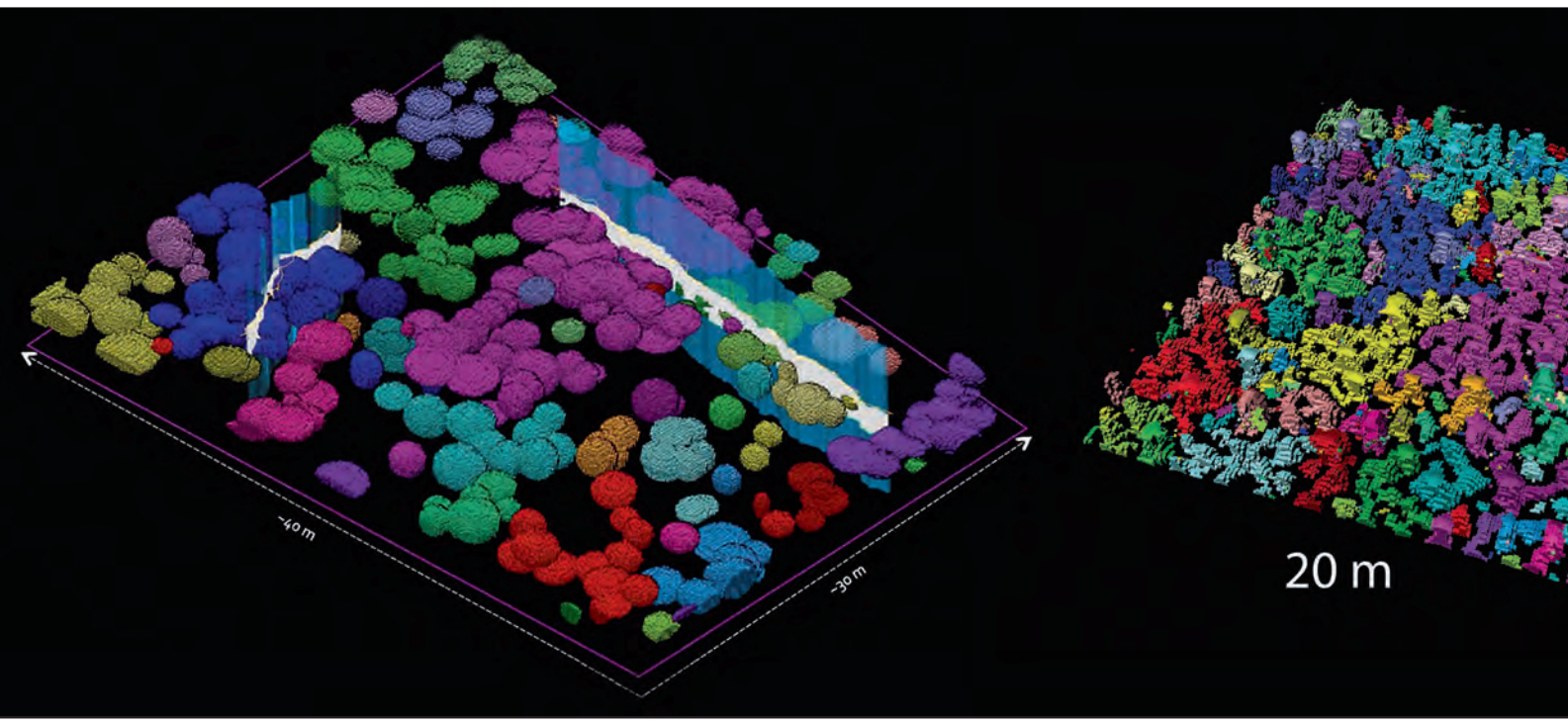

Fig. 11: A comparison between two reservoir models derived from data collected in the field. "Blobs" represent microbial mounds and mound complexes and colours identify connected mounds.
Full caption online

facies occurrence. This enables the program to make predictions in other palaeogeographic and temporal settings. Therefore multiple model-runs following systematic variations in the initial conditions and the parameter values are performed so as to refine the prediction of the controls on facies occurrence.

As well as basin margin-scale modelling (to assist with large-scale facies predictions), forward stratigraphic modelling can be used to model the local distribution of mounds and intermound facies (Fig. 11). Comparisons of classic static modelling in Petrel are made with predictive forward numerical modelling, both informed by outcrop data from quarries with faces of varying orientation.

Conclusions

Predicting the occurrence of microbialite mounds can be achieved in this setting though detailed fieldwork when combined with mapping the syndepositional tectonic setting using subsurface data. This prediction can be extended to other basin settings, using forward stratigraphic modelling based on known environments and growth rates of microbial communities, controlling process rates for extensional basins and interpreted rates of lake-level change.

However, predicting whether or not microbialite mounds might occur in other lacustrine basins is a much harder nut to crack as lake hydrology is extremely variable and localised, being dependant on climate, fluvial architecture and hinterland geology. Despite these scientific questions, for which we still await answers, progress has been made in predicting mound distribution; with important implications for hydrocarbon exploration and production.

Outcrop analogues and forward stratigraphic modelling can help reduce uncertainty in exploration risk for the enigmatic lacustrine carbonates of the South Atlantic. Understanding likely facies belt distributions is critical in chasing an optimal exploration trend, especially when several opposing depositional models may exist.

The iterative testing of different solutions using stratigraphic modelling can improve our predictive capability; capturing the range of possible outcomes; reducing uncertainty and achieving a better understanding of risk. ◆

FURTHER READING

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Gallois, A. 2016. Late Jurassic lacustrine carbonates; a multi-scale analysis of the Mupe Member (Purbeck Limestone Group) of the Wessex Basin, UK. Unpublished PhD thesis, Royal Holloway University of London.

Prof. Dan Bosence[1], Prof. **Peter Burgess**[1,2], **Dr Arnaud Gallois**[1,3], **Dr Estanislao Kozlowski**[1,4], **Dr Ian Billing**[5], and **Prof. Bernie Vining**[1,6].

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Fig. 6. The fresh-water Laguna Bacalar, in Quintana Roo region of Yucatan, Mexico - a valuable analogue for microbial mounds of the L. Purbeck Limestone Group. Here, in lake margins, mounds develop initially around shoreline trees (mangroves that form part of an ecological succession through to more mature vegetation and soils, background). Together these facies are accumulating in a regressive highstand succession from lake floor, through lake margin mounds, to emergent soils

KARL MAYER-EYMAR AND

BARTON-ON-SEA

David E W Hall* explores their joint contribution to geology and palaeontology

The cliffs at Barton-on-Sea have long been a source of fossils and, thanks to the erosion of the cliffs, new finds are continually being exposed with little excavation. The fossils found are relatively recent in age (Bartonian and Priabonian Stages of the Upper Eocene Series) and weather out easily and naturally from the fine-grained clayey sands of which the cliffs are primarily formed. More than 500 species have been recorded, including corals, fishes, mammals and reptiles with sharks' teeth and plant fossils being very common.

Brander

Numerous collectors, both expert and amateur have been attracted to Barton, the first of note being Gustavus Brander. In 1766 he published the first catalogue of Barton fossils which included many fine illustrations and it was the first to be issued by the British Museum. Many of these early collectors became experts in their field and contributed to the transformation of the pastime of fossil collecting into the scientific and academic profession that it is today. However, there was one expert who never visited England but nevertheless had a deep interest in the geology of the Barton Cliffs.

That man was Karl Mayer-Eymar, a Swiss geologist with a particular interest in and knowledge of stratigraphy, who subdivided the Tertiary into 12 stages named for localities in Northern Europe where the geology was found to be similar. He was born in Marseille in 1826 to Swiss parents and was baptised Karl David Mayer - but changed his name to 'Mayer-Eymar' in later life.

While still young, the family moved to Cohigná (now called Cohignac) near Rennes and following his father's death he went to live with his uncle in his father's home town of St Gallen in Switzerland, where he attended the grammar school.

In 1846 Mayer, as he was still known, enrolled at the Zurich Polytechnic (now ETH Zurich - Swiss Federal Institute of Technology) which was attended by many notable scientists including Albert Einstein. Mayer's chosen subjects were medicine and natural history, but he turned to geology and palaeontology following his schoolboy passion for collecting fossils. After graduation he worked in Paris (1851-54), principally at the Muséum d'Histoire Naturelle during which time he developed the concept of the subdivision of beds and courses into stages.

Zurich

Mayer-Eymar spent most of his career at the Zurich Polytechnic where in 1858 he was appointed assistant in the geology faculty. Later he became lecturer and curator of the collections, a position he held until his death. Mayer-Eymar moved to Zurich in 1873 and in 1875 he was appointed professor of stratigraphy and palaeontology at the University of Zurich. In 1896, he took up residence at Limmaplatz 34 - a rather modest residence for a University Professor - and lived there until his death.

Karl Mayer-Eymar brought extensive collections back to Zurich from his travels in Western Europe and the Mediterranean. His entire collection, comprising c. 350,000 objects, is owned by ETH Zurich but is on permanent loan to the Basel Museum of Natural History. He published voluminous lists and descriptions of these materials, but mostly without illustrations, which lessened their usefulness. His obituary (in *Verhandlungen der Schweizerischen Naturforschenden Gesellschaft* - Discussions of the Swiss Society of Natural Sciences) lists 91 papers published during his life. Lengthy obituaries can also be found in *Eclogae Geologicae Helvetiae* (Short Notes on Swiss Geology) and the Journal de Conchyliologie (*Journal of Conchology*).

GSL largesse

In 1892 the Geological Society of London awarded Meyer-Eymar the sum of £21 0s. 0d. from the Barlow-Jameson Fund. The award was: ".. an ▶

> MAYER-EYMAR, KNOWN AS 'TERTIARY MAYER', WAS DESCRIBED AS AN ORIGINAL AND SOMETIMES PICTURESQUE CHARACTER

▶ expression of the interest we take in the work which he is now carrying on so vigorously in Egypt, and of our desire to aid him in it". In 1894 he was also awarded the Prix Savigny by the French Académie des Sciences.

It was Mayer-Eymar's stratigraphical works however, that were of greatest importance and in 1857 he published his paper *Versuch einer neuen Klassifikation der TertiärGebilde Europas* (*An Attempt at a New Classification of the Tertiary Formations of Europe*) in which he details his division of the Tertiary into stages, as shown.

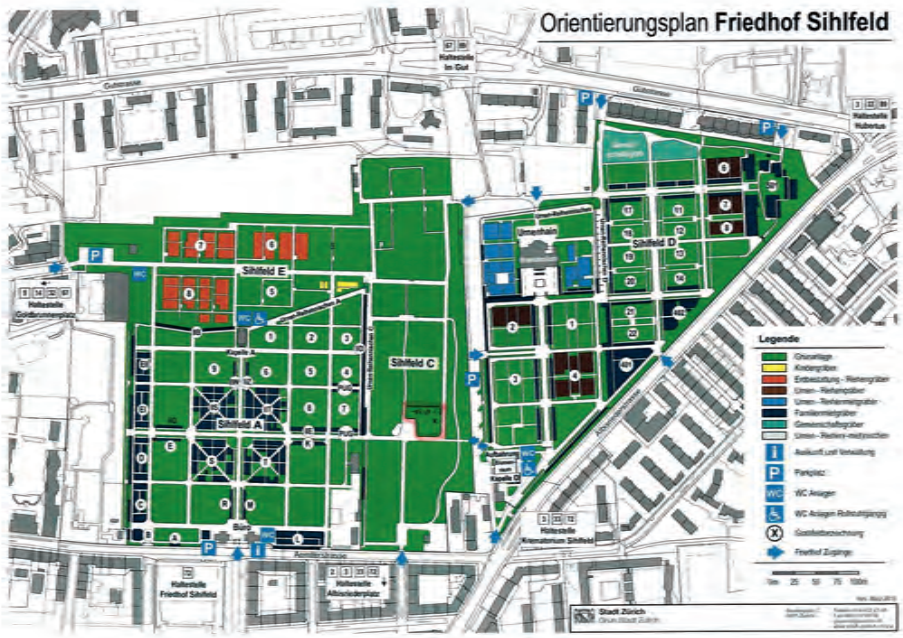
He modified his original classification many times and this has been further revised as subsequent research has refined the geological timelines. Some names Mayer-Eymar introduced were never adopted or used for only a short time. Others, including 'Bartonian', are still employed, although with somewhat modified definitions.

Mayer-Eymar deduced that the strata in locations with similar geology and containing similar fossils had been laid down during the same historical period and with his large collection of fossils, he had much of the necessary data to produce his 1857 paper. As he never visited England, he would have had no personal knowledge of Barton geology; but nevertheless there are fossils of Barton provenance in his collection. These are known to have been procured via dealers.

New name

Karl Mayer changed his surname to Mayer-Eymar on 25 January 1881. Mayer was a very common Swiss name, especially in St Gallen where there were so many that the city records cannot

Stage No.	Mayer-Eymar Stage Name	Primary Location	Modern Geological Name
1	Soissonische Stufe	Soisson, France	
2	Londonische Stufe	London, England	
3	Parisische Stufe	Paris, France	
4	Bartonische Stufe	Barton-on-Sea, UK	Bartonian
5	Ligurische Stufe	Liguria, Italy	
6	Tongrische Stufe	Tongria Belgium	
7	Aquitanische Stufe	Aquitaine, France	Aquitanian
8	Mainzische Stufe	Mainz, Germany	
9	Helvetische Stufe	Switzerland	
10	Tortonische Stufe	Tortona, Italy	Tortonian
11	Piacenzische Stufe	Piacenza, Italy	Piacenzian
12	Astische Stufe	Asti, Italy	Astian



Plan of cemetery showing site of KME's Grave (Sihlfeld C)

identify his uncle. However, with his new double-barrelled moniker he could now be sure that he would be recognised for his geological findings and papers. How or why he chose 'Eymar' is not known; but it cannot be a coincidence that it is an anagram of 'Mayer'.

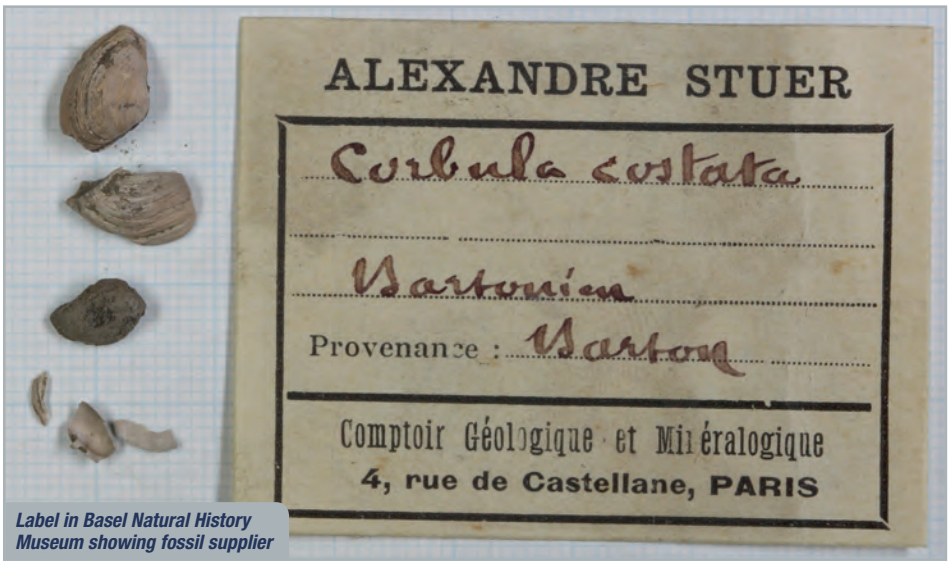
Mayer-Eymar was known among his contemporaries as 'Tertiary Mayer', such was his interest and expertise in the Tertiary period. He was also described as an original and sometimes picturesque character - which is reflected in the photograph taken sometime before his name change.

Karl Mayer-Eymar never married. He died on 25 February 1907 and was buried in Zurich at the Sihlfeld cemetery, plot C 2358. The area has since been cleared, but the plot has not been disturbed and so Karl Mayer-Eymar's remains still rest where they were laid.

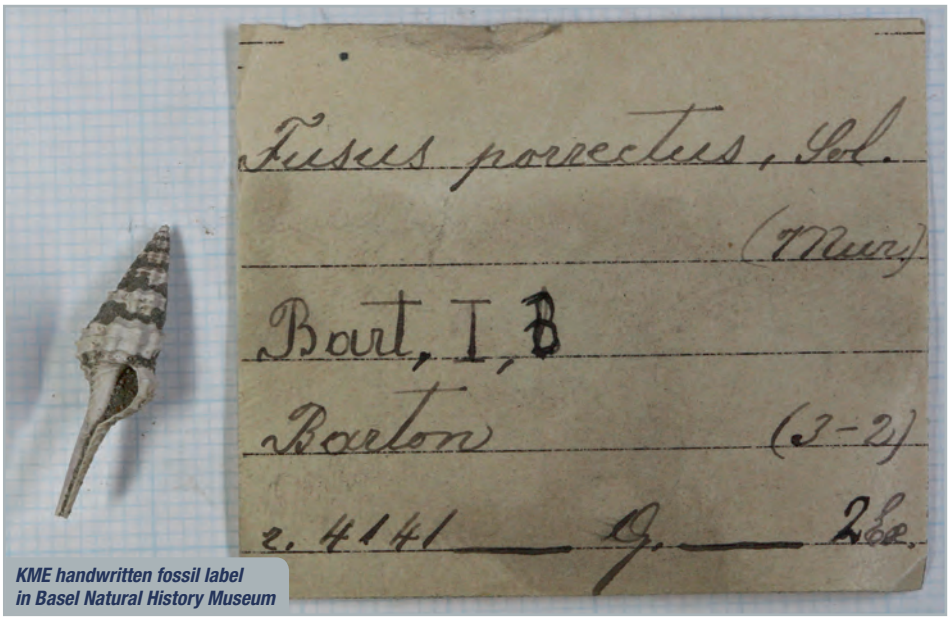
Mayer-Eymar appointed Albert Heim, also a noted Swiss geologist, executor of his will. Heim also studied at Zurich Polytechnic from 1867 to 1869 where he presumably first met Mayer-Eymar. Regrettably, no record of the will can be found.

Barton fossils have found their way into many national and international collections. Most being built up in the late 19th and early 20th centuries, when Barton was one of the 'classic' localities, and collectors were beginning to appreciate their importance and value. Today, owners of collections containing uncatalogued Barton fossils may find that they are rare or scientifically important.

The significance of Barton Cliffs is now recognised by the International Commission on Stratigraphy as the world type locality for the Barton Beds. In 1981 the cliffs were designated a Site of Special Scientific Interest (SSSI) and are described as 'One of Britain's most important stratigraphic and paleontological sites'. They will forever be associated with Mayer-Eymar, an enigmatic – and anagrammatic – palaeontologist. ◆



Label in Basel Natural History Museum showing fossil supplier



KME handwritten fossil label in Basel Natural History Museum

*** David E W Hall, Milton Heritage Society. David would like to hear from anybody with further information about any of the topics in this paper or any curators with fossils of Barton provenance in their collection. E: mail@davidewhall.plus.com**
The full text of the paper of which this is an edited extract may be viewed at bit.ly/2ITXbjt

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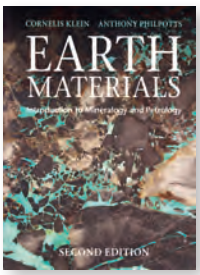
MEETING	DATE	VENUE AND DETAILS
Geothermal Energy - From Potential to Implementation	11-13 July	**Venue:** Burlington House. **Organised by:** Cranfield University. Fees & discounts apply – see website for details. **Contact:** Wayne Coulter **E.**coulter@cranfield.ac.uk.
Lapworth's Logs	n/a	'Lapworth's 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.

EVENTS

PLEASE NOTE THAT THERE ARE MANY MORE MEETINGS FOR WHICH WE DO NOT HAVE SPACE. ALWAYS CHECK WITH WWW.GEOLSOC.ORG.UK/LISTINGS

MEETING	DATE	VENUE AND DETAILS
William Smith 2018: Mineral resources at the frontier **Geological Society Year of Resources**	2-3 July	**Venue:** Burlington House. Fees & discounts apply. See website for details. **Contact:** Rhianna McLean **E:** rhianna.mclean@geolsoc.org.uk
Drawing out the Dinosaurs: two centuries of science discovery and artistic inspiration **Lapworth Museum**	4 July	Social event & open day. Venue: Lapworth Museum of Geology, Birmingham University. **Time:** 10.00. Free. **Contact:** Anna Chrystal **E:** lapworth@contacts.bham.ac.uk
Aust Cliffs Field Trip **Western Regional**	7 July	Field trip. **Time:** 10.00, lasting three hours. Free. For details and meeting point, see website. **Contact E:** westernregionalgroup@gmail.com.
Use of the deep subsurface in the UK: implications for groundwater resources	11-12 July	**Venue:** Burlington House. For details and registration, see website. **Contact** Sian Loveless **E:** sian@bgs.ac.uk
South Wales Annual Weekend **Rockwatch**	14-15 July	Field trip. **Venue:** Pembrokeshire Coast. For details and registration see website **W:** www.rockwatch.org.uk. **Contact:** **E:** rockwatchatga@btinternet.com
Postgraduate Research Symposium 2018 **Near Surface Geophysics Group**	16 July	**Venue:** Leeds University School of Earth & Environment. See website for details. **Contacts:** Adam Booth (University of Leeds), Jamie Pringle (Keele University). **E:** a.d.booth@leeds.ac.uk

Earth Materials – Introduction to Mineralogy and Petrology (2nd Edn.)



Weighing-in at over 600 pages, presented in large US 'quarto'-style format with numerous colour photographs, figures and graphs, the second edition of this established textbook is a truly comprehensive introduction to mineralogy and petrology!

Arranged in 18 chapters, the volume guides the reader through the fundamentals of geology, rock-forming minerals and rock identification, before concentrating on the more detailed aspects of geology such as crystallography, microscopy and mineralogy. There are useful chapters on igneous, metamorphic and sedimentary rock-forming minerals, all presented with appropriate / diagnostic photographs and figures. The final few chapters discuss economic minerals, resource potential of geological materials, including geothermal energy, hazard assessment and minerals that have a detrimental effect on human health and welfare.

The volume contains a thorough glossary and several indexes for specific minerals and rocks (in addition to a general index). The volume also contains a chart for the estimation of mineral abundance via microscope examination (or hand specimen), and the periodic table of the elements. The second edition also features a completely new chapter providing an elementary introduction to thermodynamics, kinetics, radioactive decay and absolute dating. A new section is also included on hydraulic fracturing ('fracking') and discussion of some of its most serious potential environmental effects (primarily from a US perspective).

Each chapter ends with a concise summary of the learning aims, offers review questions and indicates useful online information sources and suggestions for further reading. PowerPoint slides and JPEGs of all figures from the volume are also made available online from the publishers. At the time of writing this review, these resources appear to be available only to academic staff / instructors.

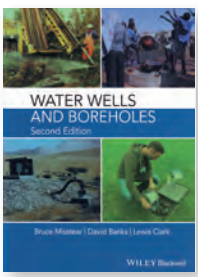
The second edition has clearly been updated and revised based upon teaching / classroom experience and student feedback acquired by the authors.

In summary, the volume provides an excellent undergraduate overview of how mineralogy and petrology relate to planet Earth, its formation and modification by sedimentary, igneous and metamorphic processes. The addition of the new chapter about thermodynamics and kinetics underpins the thorough treatment of key concepts in petrology and mineralogy. An excellent revision to an established and authoritative text. An affordable and recommended read.

Reviewed by: ***Mark Griffin***

EARTH MATERIALS – INTRODUCTION TO MINERALOGY AND PETROLOGY (2nd Edn.)
by CORNELIUS KLIEN AND ANTHONY PHILPOTTS. Cambridge University Press. 2017. ISBN 978-1-60885-967-2. Sbk. 616pp **List Price: £49.99.**
W: www.cambridge.org.uk.

Water Wells and Boreholes (2nd Edn.)



When the first edition came out it was a welcome addition to the hydrogeology library of books on water well drilling. This second edition has been revised and contains additional material that adds an extra 20 pages. As with the first edition, it puts the design and construction of boreholes in the context of the local hydrogeological conditions and goes further by including more information.

New material includes the design considerations for the use of groundwater and wells in heating and cooling schemes including the problems of re-injecting water that include minimizing mixing and other problems that can result. It also includes the dual rotary drilling rigs that have a conventional top drive system to operate the main drill string while a lower drive rotates an outer casing. The sonic method of drilling that was first established in 1913 has also been included and is now used mainly in unconsolidated formations. The section on geophysical logging now has been extended to include distributed (fibre optic) temperature sensing, a new technique for monitoring temperature in real-time in a number of environments that included boreholes as well as river, lakes and the soil.

Pumping tests on large diameter wells has been added where the problem of a large volume of water stored in the well is taken into account in the analytical equations. The use of geophysical logging during pumping tests is included showing methods of observing the precise movement of groundwater induced by pumping. The chapter on groundwater sampling includes the methods used to sample stable isotopes of oxygen-18, carbon-13, sulphur-34 and oxygen-18 within the sulphate ion. It also includes a new section on sampling dissolved gasses that are commonly carbon dioxide, methane, nitrogen, oxygen, inert gases such as argon and helium and chlorinate fluorocarbons (CFCs) and sulphur hexafluoride (SF6) that are both man-made and can be used for dating groundwater.

The existing chapter on Well and Borehole Records has been extended by an example of hydrogeological database using data from a network of boreholes in the Faryab province of Afghanistan. This book with its new content is recommended for all those working in well design and construction whether experienced practitioners or students.

Finally, this revised edition would have made Lewis Clark very pleased as it is based on his original book published in 1988. Those of us who knew and worked with Lewis are pleased that his influence in water well design and construction lives on through this book.

Reviewed by: ***Rick Brassington***

WATER WELLS AND BOREHOLES (2nd Edn.)
by BRUCE MISSTEAR, DAVID BANKS & LEWIS CLARK 2017. Published by John Wiley & Sons 536 pp ISBN: 978-1-118-95170-5 **List Price £65.00 hardback; £58.99**
E-book ISBN: 978-1-118-95170-5 W: bit.ly/2H1zqjs

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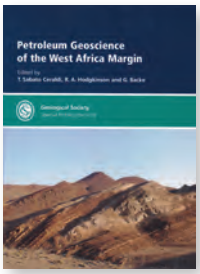
If you would like to contribute a review, consult the list of available titles on p23. Better still, go online to W: **bit.ly/2LVID0z** for a list that is always complete and up-to-date. *Editor.*

Petroleum Geoscience of the West Africa Margin



This new volume represents an excellent snapshot of the state of affairs in petroleum exploration across the entire margin of West Africa. It is well edited and the individual contributions are of a very high technical standard. It is the nature of Special Publications that they assume a considerable pre-knowledge of an area or subject; they are not introductory textbooks. As such, only certain elements will be useful to those seeking a primer to the area.

As with most of these volumes, the production started as a successful Burlington House conference. The subsequent oil industry downturn obviously had a strong impact on the conversion of conference presentations to published chapters. It is a shame, although understandable, that further authors couldn't contribute as it would have been beneficial to see additional material on areas such as Nigeria and Guinea Bissau. Moreover, the topic focus is firmly on tectonics and exploration scale problems with the notable absence of production scale geology. The smaller set of papers also means that some geographical continuity is missing between, for example, Mauritania and Sierra Leone. The upside is that the smaller set of contributions maintain a very high standard and the editors should be highly praised for bringing together a set of papers for a successful publication in difficult circumstances.

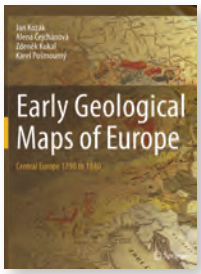
The research presented is, considering the large area covered, broad ranging - from oddball lithofacies in Ghana to extensional structures in South Africa. Particular highlights are subjective but include an excellent integrated overview of the underpublished Douala Basin, Equatorial Guinea. An excellent summary of the link between the lacustrine deposits of the South Atlantic conjugate margins is also offered. Finally, an interesting take on Proterozoic petroleum plays in Mauritania demonstrates the broad range of risks and uncertainties involved in chasing such concepts. One small quibble is that the papers are printed in a different order to that suggested in the introduction. It is not clear if this was deliberate, but it does not detract seriously from the whole.

This volume gives an excellent feel for the zeitgeist in West African hydrocarbon exploration, which will be valuable as the industry gears up for the next cycle. Alongside extra supporting material, such as the online conference abstracts, this makes for a very useful resource.

Reviewed by: ***Ben Kilhams***

PETROLEUM GEOSCIENCE OF THE WEST AFRICA MARGIN
edited by T SABATO-CERALDI, R A HODGKINSON AND G BACKE, 2017. Published by the Geological Society of London, ISBN: 9781786202437, **List Price: £ 90.00, Fellows Price: £ 45.00, W: www.geolsoc.org.uk/SP438**

Early Geological Maps of Europe: Central Europe 1750 to 1840



The conventional historical narrative of geological mapping as retold inside and outside of the Geological Society, typically begins with William Smith travelling the around England before producing his famous map in 1815. Convention rather skips over the many precursors to Smith. Here's an attempt to redress the balance. Focusing on the lands to the north and east of the Alps, the authors have raided the libraries and archives of Central Europe for their treasures to produce this atlas of rarities.

The main portion of this book presents full-colour reproductions of the maps along with bibliographic descriptions and a paragraph of commentary outlining the importance of the map. This amounts to a rather glossy catalogue of 18th Century thematic mapping that could be considered to a modern viewer to be geological in nature. It would have been good to be able to see more detail on the images, however according with its price bracket, the book is only 29 x 21 cm in size, so for many of the maps displayed not even a magnifying glass is going to help you. The resolution of the image scans for the most part is sufficient for a book of this size with one or two suffering poor reproductions. The commentary limits itself to enhancing description rather than discussion in most cases.

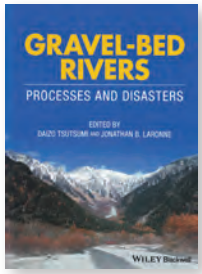
The catalogue section is topped and tailed by summary essays of the geological setting of the area as well as some short discussion on the information the maps present in the context of this history of stratigraphic mapping, structural mapping and economic geological mapping. These overviews are aimed at a wide readership and thus only skim the surface of their subjects. It would have been good to have more depth to the bibliographies of the map-makers as well, although there are several well-known names represented here, there are also many less-storied cartographers I would have enjoyed discovering more about.

A laudable attempt to bring the early geological maps and mapmakers of Central Europe to wider attention let down by its format and by attempting to simultaneously please disparate audiences of geologists, historians, librarians, and collectors leading to rather simplistic overviews. Suitable as a reference work or as a starting point for research in this cartographic niche.

Reviewed by: ***Paul Johnson***

EARLY GEOLOGICAL MAPS OF EUROPE: CENTRAL EUROPE 1750 TO 1840
by JAN KOZÁK, ALENA ČEJCHANOVÁ, ZDENČK KUKAL, ANDČKAREL POŠMOURNÝ. 2016 Published by: Springer Hbk. ISBN 978-3-319-22487-9 **List Price: £32.00. eBook: £25.99. W: www.springer.com/gb/book/9783319224879**

Gravel-Bed Rivers - Processes and Disasters



This weighty tome is not something you would pick to take on a journey, but if you are looking for some of the latest papers on what the gravel-bed research world is doing then this book is for you. It represents the outcome of the 8th International Gravel Bed Rivers Workshop in Kyoto, Japan and Takayama,

held in September 2015.

The objective of the workshop was to present the latest progress in understanding the morphology and processes operating in gravel-bed rivers, with the key theme focusing on disasters arising from flooding in gravel bed rivers. Most research has been about what happens in bank-full conditions, but the real damage happens once gravel-bed rivers breach their banks. When this occurs the impact on our societies can be significant, and it can lead to many lost lives. The theme was particularly pertinent to the workshop being in Japan as more than half of all disaster related deaths in Japan over the 2010-2014 period occurred as a result of gravel-bed river-related events.

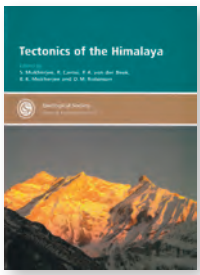
The book has 28 topic papers. Many deal with methods for modelling gravel-bed processes looking at the morphology found in rivers, and how flow conditions affect the grading and porosity in fluvial sediments. The effect that river bed morphology has on flow conditions forms the subject of some papers as well. So if you were needing to understand the complex modelling options available this book should satisfy many questions you might have.

However, there is more to the book than mathematical modelling papers. There are also case studies on lahar disasters from Indonesia, on reservoir sediment flushing and replenishment below dams in Japan, a review of geomorphic responses to dam removal in the USA and descriptions of catastrophic gravel deposition from outbreak floods. There are also papers looking at the ecological implications of intermittent flow in gravel-bed rivers and consideration of how vegetation and 'large wood' should be modelled to assess the effect on flow (and *vice versa*). It is interesting that there is nothing looking specifically at how climate change is likely to impact disasters related to gravel-bed rivers, as one might expect in this day and age. Last but not least, the book ends with a paper looking at fluvial gravels on Mars. I wonder what risk assessments for Martian field surveys would comprise!

Reviewed by: ***James Montgomery***

GRAVEL BED RIVERS - PROCESSES AND DISASTERS
by DAIZO TSUTSUMI & JONATHAN B LARONNE (eds) 2017. Published by: Wiley Blackwell. 783pp. ISBN 9781118971406, **List Price: £150 (hbk)**
E-book: £135 W: www.wiley-blackwell.com

Tectonics of the Himalaya



This book arises out of the 29th Himalayan-Karakoram-Tibet workshop held in Lucca, Italy in September 2014. It contains 13 papers that range from geophysics through structural geology to aspects of metamorphic and magmatic petrology and then to geochronology. All the papers are scientifically strong. I enjoyed reading them and learned much. There are many colour illustrations including maps, cross sections, field photographs, micrographs and data plots. As with any GSL Special Publication the production is excellent.

Having said that, I have two philosophical issues with this volume. Before addressing these I must register an interest as co-editor of two previous GSL Special Publication on the Himalaya: *Himalayan Tectonics (vol 74, 1993)* and *Tectonics of the Nanga Parbat Syntaxis and the Western Himalaya* (SP #170, 2000). The former contained some 45 papers and covered the full range of orogenic processes. I am pleased to see that five of the 13 papers included in the new book reference at least one paper from volume 74, which more than 20 years on cannot be bad.

My first issue is that the title of the book is misleading. It is merely a collection of papers from a small conference, none of which directly deal with the 'Tectonics of the Himalaya'. The Introductory chapter fails to draw them together into a connected narrative. The result is that this volume contains a set of loosely linked papers which could have been published individually elsewhere, maybe to greater effect.

The second issue relates to the cottage industry that the annual Himalayan-Karakoram-Tibet workshop has now become. The first one was held in Leicester in 1985. At that time Himalaya geology was new, unexplored and exciting. It might still be the latter, but with time it has become more detailed and location specific. Thomas Kuhn would argue that Himalayan geologists are moving into a period of 'ordinary science' so, other than inspiring young geologists from Himalayan countries, why do we still run these meetings in expensive locations such as the UK, USA, Japan etc.?

Sadly, due to the lack of context, I do not find this book to add greatly to our understanding of the Himalayan orogen despite the obvious quality of the individual papers. There may be a message here to future editors of GSL Special Publications because, even as a Himalayan geologist, I see no imperative to buy this book, other than the title, and would find it difficult to put a 'buy' flag on it.

Reviewed by: ***Peter Treolar.***

Editor's note: This book was reviewed online in 2016.

TECTONICS OF THE HIMALAYA
by S MUKHERJEE, R CAROSI, P A VAN DER BEEK, B K MUKHERJEE AND D M ROBINSON (eds) Published by: Geological Society of London SP412. 323pp (hbk) ISBN: 978-1-86239-703-3, **List Price: £100.00. Fellows' Price: £50.00. W: www.geolsoc.org.uk/SP412**
E-book: £135 W: www.wiley-blackwell.com

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- **NEW! Geochronology & Thermochronology** by Peter Reiners et al., 2018. Wiley/AGU 464pp pbkk
- **NEW! The Tectonic Plates are Moving!** by Roy Livermore. Oxford UP 2018 482pp hbk
- **NEW! Reservoir Modelling - a practical guide** by Steve Cannon. Wiley Blackwell 2018 312pp hbk
- **NEW! Large Igneous Provinces from Gondwana and Adjacent Regions** by Sensarma S and Storey B C 2018 Geol Soc Pub Hse., SP #463 278pp hbk
- **Geology - a very short introduction,** by Jan Zalasiewicz. Oxford UP, 2018 July.
- **Land Bridges: ancient environments, plant migrations and new world connections** by Alan Graham. Chicago University Press 2018 310pp sbk
- **The Epochs of Nature by Georges-Louis Leclerc, Comte de Buffon. Transl. & Ed.** by Jan Zalasiewicz, Anne-Sophie Milon & Mateusz Zalasiewicz. Chicago UP, 2018. 190pp hbk. Illustrated.
- **From Source to Seep - geochemical applications in hydrocarbon systems** by Lawson et al. (eds) 2018 Geol Soc Spec Pub #468 208pp hbk
- **Introduction to Endvironmental Modelling** by Gray WG & Gray GA 2018 425pp sbk
- **The First Global Inegrated Marine Assessment - World Ocean Assessment 1 (united Nations)** by Ijnnick L and Simcock A (coordinators) 2018 973pp hbk
- **Petroleum Geology of NW Europe: 50 years of learning (Proc. 8th PGC)** by M Bowman and B Levell (eds) 2018 GSPH 646pp hbk in slipcase
- **Exploration of Subsurface Antarctica 2018** by Siegert M A, Jamieson S S R, & White DA (Eds). GSL SP461. 256pp (hbk)

DISTANT THUNDER

Show and tell

Geologist and science writer Nina Morgan muses on the best methods of presentation

It's one thing to have a breakthrough idea, and quite another to find the best way to make it known. For the pioneering 19th Century geologists, reading papers at scientific societies, which were often then circulated in the form of long and wordy books and articles, were the standard methods. But soon the realisation struck that maps, cross-sections and diagrams could be more effective. It could be argued that William Smith [1769 - 1839] kicked off this new communications trend in 1799 with his pioneering large scale geological map of the area around Bath. He later consolidated his lead with his wonderfully coloured 1815 Geological Map of England and Wales.

But Smith was not the first geologist to recognise the usefulness of diagrams and cross-sections for explaining the origin of geological features. Another exponent of this technique was the Derbyshire geologist, White Watson [1760 – 1835]. As the geologist Trevor Ford [1925 – 2017], an expert on the Peak District in Derbyshire and champion of White Watson noted: "White Watson should be remembered for having provided a foundation of stratigraphical science in Derbyshire comparable to William Smith's earlier work around Bath".

Bakewell-based

Watson, was born at Whiteley Wood Hall near Sheffield, but lived for most of his life in Bakewell, Derbyshire. His uncle ran a small marble mill and shop in Ashford-in-the-Water, and from an early age Watson enjoyed visiting quarries and collecting fossils and minerals to keep the shop supplied. His uncle retired to Bakewell and in 1774 White joined him there. After his uncle died the mill was sold, but White, nothing if not enterprising, went on in 1825 to advertise on his business card as one who: *'executes monuments, tombs etc., gives lessons in geology and mineralogy and furnishes collections, affords information to antiquaries and amusement to Botanists'.*

He went on to set up a museum-shop, where his fossil and mineral collections were open to view for a small charge, and gave lectures on geology – usually at five shillings per head. He was a prolific collector and built up fossil and mineral collections, (sometimes of up to 500 specimens) for sale. He also earned an income by drawing profiles, either in ink or as marble inlays.

Watson appears never to have strayed more than 25 miles from his base in Bakewell, and as a result got to know the local geology very well. His published sections in his 1811 book, *The Strata of Derbyshire* (to give it its short title!), were among the first reasonably accurate geological sections to appear in Britain.

Set in stone

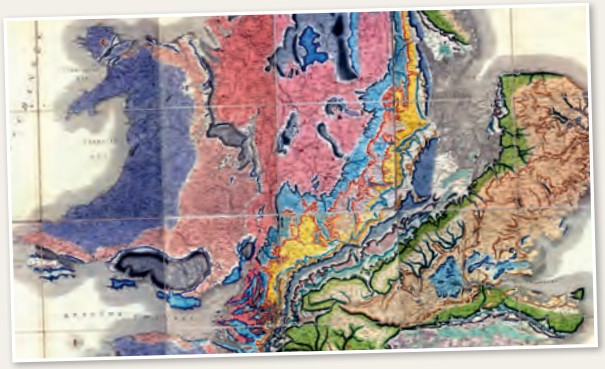
Although he drew a sketch map of the limestone districts of Derbyshire in around 1820 and an innovative circular diagram to illustrate the stratigraphic correlations in Derbyshire in c. 1825, paper, it seems, was not Watson's preferred medium for disseminating knowledge about geology. Instead, he turned to stone. His most famous – and beautiful – 'publications' take the form of cross sections presented as inlaid stone tablets. In these marble-backed plaques the strata consisted of inlaid pieces of the actual stones they were designed to represent.

His first tablet, illustrating 'A Section of a Mountain in Derbyshire', was made probably made around 1785. He went on to create more than 100 others, some illustrating geological processes such as volcanism, and others showing cross-sections of the geology in different parts of Derbyshire.

Great minds

Publications accompanying these early sections demonstrate that Watson was familiar with William Smith's principle of strata being characterised by certain fossils. But although Smith and Watson were near contemporaries, and Smith travelled widely through England, there is no evidence that the two ever met. Nevertheless, they shared a number of personality traits. Both enjoyed writing poetry and were full of good ideas for furthering and presenting the understanding of geology. Both were full of money-making schemes and were very hard workers in a number of different fields of enterprise. And both were also perpetually short of money, and often had to solicit loans from relatives or employers to continue their work.

The evidence from their archives reveals the reason why. When it came to money management and keeping accounts, both were abysmal failures!



Smith was not the first geologist to recognise the usefulness of diagrams

Acknowledgement
Inspiration for this vignette comes from a meeting to celebrate the life of Trevor Ford, held in Buxton in June 2018. Sources for this text include: White Watson and his Geological Sections by Trevor Ford, *Proc. Geol. Assoc.* **71**, pt 4, 1960, pp 349 – 363; The tablets of White Watson by Trevor Ford, *Geology Today* **14**, no. 1, 1998, pp. 21 – 25; and *The Strata of Derbyshire* by White Watson, first published in 1811. I am also grateful to the collections managers at the Oxford University Museum of Natural History and the Derby Museum for images and information about the tablets in their collections.

* **Nina Morgan** is a geologist and science writer based near Oxford. Her latest book, The Geology of Oxford Gravestones, is available via www.gravestonegeology.uk

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

The Society notes with sadness the passing of:

Barnes, Simon James *
Booth, Tony *
Bowen, Geoffrey Gordon *
Chillingworth, Patrick Cecil Hamilton *
Drysdall, Alan Roy *
Droogmans, Serge L *
Elueze, Anthony Azbuike *
Fischer, Alfred*
Gladwell, David Robert *
Helm, Derick *
Helm, Douglas George *
Howell, Frank Travis *
Kelly, Desmond Michael *
Kenna, Raymond *
Laws, Michael James *
Leighton, James *
Marshall, Mr John A *
Milward, Anthony Frederick *
Morgans, Michael William *§
O'Reilly, Kevin J O *
Pegg, Eric Arnold *
Shepherd, Colin*
Shingleton, Sam *
Smith, Howard James *
Thomson, Martyn Hugh *
Whitlow, Roy *

Young, Paul Ivor *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 in 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.

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OBITUARY John Alfred Catt 1939 - 2017

Quaternary geologist at Rothamsted Experimental Station, and expert on the geology of Hertfordshire

John Catt was upright, modest and a gentleman, in every sense of the word and he is deeply missed by family, colleagues and friends. John was born in Kent in April, 1939 the son of a gardener who worked at the local vicarage. The Anglican Church was an institution he was soon introduced to and one with which he remained closely associated for the rest of his life.

Rothamsted

John was educated through Ashford Grammar School and, in November, 1956 made the arduous train journey northwards to be interviewed by Lewis Penny, Head of Geology at the University of Hull. He was immediately offered a place to read for a joint degree in geology and chemistry. However, to quote John, "after the first breathless year of 22 hours lectures plus 12 hours practical classes per week I pleaded with Lewis and John Neale to join the Special (single) Honours Class in Geology." John never looked back; he gained an upper second class degree, which gave him access to a doctoral scholarship to study the Quaternary of East Yorkshire.

The next three years (1960-63) were, "the happiest and most stimulating of my life." He completed his thesis within the requisite three years of his grant and immediately took up the position of Scientific Officer, in the Pedology Department at Rothamsted Experimental Station, Hertfordshire. He stayed at Rothamsted for the rest of his professional career, rapidly progressing to Principal Scientific Officer in the Soils and Plant Nutrition Department (1977) and becoming Deputy Head of Rothamsted (Acting Head of Soils and Agronomy Department) in 1988. He continued his research at Rothamsted from 1990–1998 and after, until 2016, he was Honorary Professor of Geography at UCL.

> "JOHN'S ACADEMIC CAREER SPEAKS FOR ITSELF, AS AUTHOR AND CO-AUTHOR OF 220 PEER REVIEWED PAPERS AND A SERIES OF BOOKS"

Hertfordshire

John's academic career speaks for itself, as author and co-author of 220 peer reviewed papers and a series of books, Including *Hertfordshire Geology and Landscape*. This 2010 publication was a labour of love taken on as co-author and editor in 1975. It is a hugely respected publication setting the standard for books on local geology.

John was awarded a DSc in 1981 by Hull University for research into Quaternary Geology and Soil Science and the YGS John Phillips Medal in 2004. He became Fellow of the Geological Society in 1971, a Member of the Institution of Geologists in 1985 and Chartered Geologist in 1991; he served on numerous scientific advisory committees and was elected Vice President of the Geological Society London in 1996. The Society recognised his services to science in 2015 when they awarded him the Distinguished Service Award. Throughout his life, John was dedicated to the geology of Hertfordshire, being at times Chairman and Honorary President of Hertfordshire Geological Society (HGS) and a stalwart supporter of Hertfordshire Natural History Society. He became the first Honorary Member of HGS in March, 2017.

His death, in December 2017, followed a persistent lung complaint, which resulted from an infection acquired during an International Quaternary (INQUA) Conference in China. Appropriately, John is buried in the Anglian gravels which rest on top of the Chalk at St. Stephens Church, St. Albans.

By Haydon Bailey

◆ A longer version of this obituary may be read online – *Editor*

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OBITUARY John Brodie Wilson 1938-2017

Pioneering marine geologist and biologist whose manned submersible dives illuminated the cold water corals of UK western shelf

John was a marine scientist who worked on the boundary between geology and biology by studying modern shelf sea environments, how these control the distribution of organisms living there and how these organisms became preserved in the fossil record. More specifically he focused on those with calcareous skeletons such as molluscs and corals, their ecology and taphonomy, and how they contributed to the production of calcareous sediment on the UK shelf.

Born and educated in Edinburgh, John obtained a first class honours degree from Edinburgh University. After a year at Caltech he continued at Edinburgh with a PhD studying how bivalve molluscs became preserved in the intertidal sediments of the Solway Firth. Using an 'actuopalaeontological' (Aktuopaläontologie) approach, being promoted at that time by German workers such as W Schäfer, he was able to demonstrate the differences between shell beds formed on tidal flat surfaces and those on the floors of tidal channels and how different bivalve species were preferentially preserved in these sediments.

IOS & classic papers

Following his PhD in 1965, John obtained a lectureship for four to five years at Aberdeen before beginning his productive career at the Institute of Oceanographic Sciences (IOS), near Godalming, Surrey. Here he joined an active research group who were making major advances in the hydrography, sedimentology, and ecology of the UK's shelf seas using innovative equipment such as side-scan sonar. At IOS John was one of the first to use manned submersibles to study deep-water coral reefs or thickets in waters 200-300m down off the western shelf of the British Isles. This work led to a number of classic papers and his major contribution to our science. Fortunately, the videos and commentaries of some of his 1973 dives have been saved by colleagues working with the British Film Institute and can be viewed at **bit.ly/2Jqi3hJ**

In these pioneering submersible dives John made critical observations on how cold-water coral patches formed by Lophelia pertusa developed to form coral rings; large colonies expanding out from existing small fragments of hard substrate. Today, referred to as 'Wilson rings', the environmental controls on these formations are still of research interest. Working in the cramped conditions in Pisces submersibles John's keen eye and observational skills were the vital ingredients that laid foundations for work on cold-water corals that has been growing exponentially since the late 1990s.

Royal Holloway

With the closure of the IOS at Godalming in 1995 John moved to an Honorary Research Fellowship at Royal Holloway University of London where he carried out research on material collected during his many IOS cruises and assisted with teaching and PhD research supervision. A fortuitous meeting with André Freiwald led to fruitful collaboration on Lophelia reefs and thickets - most notably, the extensive Sula reef on the Norwegian shelf.

Throughout his career John was always the most enthusiastic and supportive colleague and mentor. This enthusiasm for his subject was infectious and no one who worked alongside John at sea or back in the lab will forget the passion he brought to his work and his sheer joy at seeing something new or unexpected for the first time.

Outside his passion for his subject John was an avid collector of militaria, memorabilia from the White Star Line and the Titanic (his father was a nautical engineer who transferred skills to build an oil refinery for the Burma Oil Company). John is survived by his wife Leta, his two sons, Angus and Bruce, and by three grandchildren Jonathon, Hannah and Chloe.

By Dan Bosence and Murray Roberts with assistance from Leta Wilson

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OBITUARY Michael Bernard Collins 1944 2017

Sedimentologist who studied sediment movement based upon field measurements in tidal regimes

Professor Michael Collins was born in Amersham in 1944, but spent his early life in post-war London where he attended Marylebone High School. He obtained a BSc in Civil Engineering and completed pioneering research on the sediment yields of the Sussex rivers at Brighton Polytechnic - for which he received a DPhil from Sussex University. This led him to Imperial College, London in 1970, to study the sediment transport of the intertidal flats of the Wash.

He was appointed Lecturer in the Sub-Department of Oceanography at Swansea University in 1973, and became Head of Department in 1983. He moved to the University of Southampton in 1987 where he presided, as Head of Oceanography, over the amalgamation with the Department of Geology and with the National Institute of Oceanography, Godalming, to create the Southampton Oceanography Centre.

Research

Michael had diverse research interests evident in his publication record and in the PhD students under his supervision: many of whom went on to positions of academic importance world-wide. The central theme of his research was the fundamentals of sediment movement based upon field measurements in tidal regimes. He developed innovative field instruments for monitoring sediment transport, including electronic pebbles used to monitor gravel mobility on beaches. These studies were supplemented by laboratory measurements of threshold conditions under combined flows. He also monitored sediment dispersal using satellite (optical) and radar (microwave) sensors, coupled with field tracers such as rhodamine B dispersal to define tidal diffusion.

> “MICHAEL HAD DIVERSE RESEARCH INTERESTS EVIDENT IN HIS PUBLICATION RECORD AND IN THE PHD STUDENTS UNDER HIS SUPERVISION”

Michael was skilled at coordinating research teams and synthesising disparate studies into regional reviews of coastal systems, such as Southampton Water and Swansea Bay. His interests subsequently extended to the continental shelf, and he edited with Angel Borja a much praised volume on the Oceanography of the Basque Region, Spain and others on shelf seas. He co-founded the international Journal Continental Shelf Research, which he edited for over 30 years with Richard Sternberg (University of Washington).

Basque Country

He continued to lecture, supervise students and advise academics throughout the world, initially in France, Spain and Greece, and then further afield in Australia, India, China and Africa. In later years, he established close links between the University of Southampton and Oceanography centres in the Basque Countries and became Scientific Adviser to the Marine Research Unit of AZTI, Technalia (San Sebastian) and later Research Professor at Plentzia Marine Station (University of the Basque Country). His was subsequently awarded the title of First Ambassador of that Institute.

Michael’s scientific output was considerable. He attracted large sums of money for marine research programmes which produced 140 peer reviewed papers and over 37 PhD. theses. He will be remembered by his colleagues and students for his great kindness, patience and forgiving nature, as well as for his warm hospitality extended especially to overseas students and visiting academics in his family home.

He died of cancer in July, 2017 and is survived by his wife, who as Janice Cairns is a well-known opera singer, by a son and daughter, and by two loving grand-children.

➤ By Graham Evans and Carl Amos

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OBITUARY Paul Garrard 1938-2017

Dedicated teacher whose legendary mapping skills inspired generations of RSM students

In the late spring 2017, Paul Garrard died at the age of 79 after a tragic fall while walking his pet dog. Paul will be remembered by many staff and students as a dedicated and talented teacher who helped ensure that graduates from the Royal School of Mines are the most capable in the world. Paul's legacy is the thousands of students that he taught who have gone on to shape the world. Paul was an RSM man through and through. Professor Dick Selley, an ex-head of department, said of him: "If Paul was a stick of rock you would find the letters 'RSM' embedded in it from end to end".

Rhodesia

Paul came from a working-class background an obtained a degree from the Royal School of Mines in Geology in 1960. He then went on to spend five years mapping the Precambrian basement in Rhodesia for the Geological Survey – a time where he perfected the mapping skills that would become legendary among students. In 1965 Paul joined Anglo American Copper mines while at the same time working on his PhD at the RSM.

At beginning of the 1970s, Rex Davies, the then Professor of Mining Geology, offered him a position as a Lecturer in Mining Geology. His specific role was to run the fieldwork programme and in particular field mapping. He was the perfect man for the job.

Award

Paul remained at Imperial for the next 30 years as Lecturer then Senior Lecturer. During this time his gift for teaching and inspiring students became legendary. His contribution to teaching was recognised by the College when in 1995 the 'College Teaching Award for Geology' was bestowed upon him.

Paul Garrard will be remembered by most staff and students as a kind but demanding teacher, whose expectations were high and whose feedback and help was second to none. Students who were lucky enough to go on the Kinlochleven fieldtrip with Paul, a trip he ran for 25 years with John Cosgrove, will still have field notebooks in which each diagram and locality is adorned by helpful advice in red ink. They will remember his patient explanations and his habit of making folds, boudins and even entire mountain belts using his over-sized hands. One student joked: "It took 30 million years for the Alps to form, but I saw Paul make them with his hands in 30 seconds".

> PAUL WORKED STUDENTS HARD AND NEVER SAW WHY A LITTLE RAIN, EVEN IF MOVING HORIZONTALLY, SHOULD RUIN A DAY OF GEOLOGY. STUDENTS KNEW THAT THE WEATHER WOULD ONLY END A DAY'S FIELDWORK IF PAUL'S PIPE WENT OUT

Horizontal

Paul worked students hard and never saw why a little rain, even if moving horizontally, should ruin a day of geology. The students knew that the weather would only end a day's fieldwork if Paul's pipe went out. In the harshest weather students would watch the smouldering pipe for signs of an early return home, only to be disappointed when he would turn it upside-down and continue smoking. Paul was a gentleman geologist, with pipe and flat cap, who was apparently carved from rock.

The commitment that Paul put into his teaching came from his love for geology and a job done right. Paul knew that the legacy and reputation of a Royal School of Mines is not just in scientific and engineering developments, but in the quality of its graduates and their impact on the world.

Paul Garrard B.Sc., Ph.D., D.I.C., C.Eng., MIMM, FGS, ARSM is survived by his wife Shelagh and sons Mike and Ian.

By John Cosgrove & Matthew Genge

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 Amy Whitchurch at the Society.

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Career and Industry Days 2018/19

Wednesday 7 November 2018
Venue: Our Dynamic Earth, Edinburgh, UK
www.geolsoc.org.uk/careersday18edinburgh

Wednesday 14 November 2018
Venue: BGS, Keyworth, Nottingham, UK
www.geolsoc.org.uk/careersday18nottingham

Wednesday 20 March 2019
Venue: Royal School of Mines,
Imperial College London, UK
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Rhianna McLean, T: 0207 432 0981
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BRYAN LOVELL MEETING 2019

Role of geological science in the decarbonisation of power production, heat, transport and industry

21-23 January 2019

The Geological Society, Burlington House

In the UK and elsewhere, decarbonisation of power production, industry, transport and heating to meet climate change targets is a major challenge and one that intrinsically involves the subsurface and geoscience.

Decarbonising centralised power generation will involve expansion of renewables as well as the civil nuclear program. Renewables will require a huge increase in grid-scale energy storage to cover intermittency, which will mean greater reliance on more efficient batteries, pumped storage and compressed air energy storage. Geothermal power, heating and cooling will require assessment of resources and impacts of development, while the safety critical nuclear sector will require a detailed understanding of risks associated with natural hazards such as seismicity as well as meeting the challenge of effective geological disposal of radioactive waste. All require geological studies, for example investigating the geological origin and prospectivity of transition metals and rare earth elements for batteries; or for siting of power station, dams and tunnels in pumped water storage; geological studies for compressed air energy storage (CAES); and detailed characterisation of the subsurface for radwaste disposal.

A transition may also involve more natural gas and hydrogen, with implications for the possible supply of 'home grown' shale gas, and the underground storage and transport of hydrogen. Carbon capture and storage (CCS) and 'bio-energy and CCS' (BECCS), require fundamental research into geological sequestration and its environmental implications.

Decarbonisation is central to Government and international policy and this three day conference will host national experts from industry, academia, and government to look at the geological and reservoir engineering aspects of the problem. The main objective will be to identify the high level barriers to progress and the main science questions – and begin a roadmap to solve the problems.

Call for abstracts

Abstracts are invited from early career researchers who wish to exhibit posters at the conference. Posters that address any aspect of decarbonisation geoscience are encouraged, for example geothermal, gas storage, compressed air energy storage, critical metals, radioactive waste disposal, CCS, and bio-energy and CCS (BECCS). Abstracts should be approximately 500 words and include a title and acknowledgement of authors and their affiliations where possible. Please send your abstract as a Word document to rhianna.mclean@geolsoc.org.uk by 1 October 2018.

Convenors

Mike Stephenson (British Geological Survey)
Dave Schofield (British Geological Survey)
Sebastian Gieger (Heriot-Watt University)
Philip Ringrose (Statoil/NTNU)

Further information

For further information about the conference please contact:

Rhianna McLean, Conference Office,
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E: rhianna.mclean@geolsoc.org.uk

Web: www.geolsoc.org.uk/lovell19

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2019 YEAR OF CARBON