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Editor: LIAM GALLAGHER

The Geologists' Association

Founded in 1858 The Geologists' Association serves the interests of both professional and amateur geologists, as well as making geology available to a wider public. It is a national organisation based in London, but is represented by local and affiliated groups around the country. The GA holds monthly lecture meetings, publishes a journal and geological guides and organises field excursions both in the UK and abroad.

Subscriptions are renewed annually on November 1st.

You can join the GA on-line on our website:
www.geologistsassociation.org.uk/JoiningtheGA.html
admin@geologistsassociation.org.uk

By phone 020 7434 9298 or by post to Sarah Stafford, Executive Secretary, The Geologists' Association, Burlington House, Piccadilly, London W1J 0DU.

Research Award Deadline

15th November annually

awards@geologistsassociation.org.uk

LAST Copy dates for the Circular & Magazine:

June Issue:	April 22
September Issue:	July 22
December Issue:	October 21

Items should be submitted as soon as possible and not targeted on these dates. We welcome contributions from Members and others. gamagazine@geologistsassociation.org.uk

Curry Fund Dates for 2019

Application deadline	Committee date
May 20th	August 20th
November 20th	

curryfund@geologistsassociation.org.uk

Cover picture: Detail from *Building our cities around geology.* An original artwork by Gail Dickerson (see article on p.27) Photo: Diana Clements

Since the last GA magazine, in which we reported on the big autumn events of 2018, such as the Annual Conference and the Festival of Geology we have remained busy. For those on Council and the office staff, our attention has been focused on important administrative tasks as we endeavour to make sure the GA is compliant with the Charity Commission in terms of safeguarding and risk registers. The accounts are prepared for submission and auditing and preparation work on the Annual Report for the AGM on the 3rd of May 2019 is in hand.

Figure 1: Guilty – I ate one before I photographed!

In November 2018 I attended the Herts & North London Chalk Conference 'Groundwater supplies from the chalk aquifer; how do we collaborate for a sustainable future?' The main participants were the Environment Agency, British Geological Survey, Affinity Water and Groundwater Science. There were also a number of local special interest Groups, including local geological societies, conservation groups and fisheries.

It was a fascinating day with the scene being set as the geological framework was described. The geological community appreciated that the Chalk and overlying formations including the London Clay are not homogeneous strata. A simplistic approach to the geology has been reflected in some groundwater models and in some way the ground work necessary for major infrastructure projects has facilitated our understanding. The significance of the marl seams and fracture patterns are now the focus of much work which needs to be characterised in the groundwater models, hence the need to optimise the data acquired to bore holes. The heterogeneity within the chalk, in part explains why reducing or ceasing abstraction from a well does not have an immediate beneficial outcome on the nearby stream flows.

Figure 2: GA President (left) with Stuart Egan NSGGA (right) (Photo Peter Jones)

This is offset against a backdrop in the Chilterns where water usage is *c*.175 litres/day per person – one of the highest in Europe. The message to me was how fundamental it is to understand the subsurface geology in abstraction industries. This would help to reduce risk and potentially lead to smarter technical solutions.

I had the pleasure of attending The North Staffordshire Group of the Geologists' Association (NSGGA) 70th Anniversary Celebrations on 6th December 2018 in the William Smith Building, Keele University. They are in good company as the NHS was also 70 years old in 2018!

There was a delicious buffet meal and displays of the Group's activities over the past 70 years in addition to a fascinating array of original documentation and photographs from early field trips on display. The Group has a big hinterland drawing folk in from Manchester to Derby.

The evening's talk was given by Andrew Bloodworth (BGS) 'Into the dark: a journey to the frontiers of mineral and metal extraction'. It was a thoroughly enjoyable evening and I was really made to feel most welcome - thank you.

At this time of year with shorter days and unpredictable weather we make fewer trips into the field. However, some of my GA colleagues (Liam Gallagher, Rebecca Bell and Lucia Perez-Diaz) have been focussed in planning future events such as GA Student Symposium which is on 17th of May 2019 at Burlington House. The same is true for the convening team led by Cathy Hollis for the GA Annual Conference which is in Manchester later this year (19th - 20th October, 2019). A full day lecture programme around the theme of 'North West Power House Past, Present and Future', along with several trips, which promise be appealing and informative.

One event I am particularly looking forward to this summer is one hosted by my local Group (Hertfordshire Geological Society) a symposium in memory of John Catt 'Hertfordshire Geology & Landscape' on Saturday 13th July 2019. This is to be held at the University of Hertfordshire Bayfordury Campus. Haydon Bailey has succeeded in bringing together many of the original contributors of this informed and wonderfully considered volume on Hertfordshire's Earth Heritage to speak at this symposium - a fitting tribute to John.

In common with many of the affiliated Groups it is a time of year when the field trip and lecture programmes are being finalised. A gentle reminder to have a look on the GA website and see what is on offer. There is still time to book a trip including the one to Shetland (4th - 11th June 2019), in addition to five fascinating trips planned on the UK mainland. As for the lectures, if you are unable to attend in person it is possible for GA members to view them live or watch them at your leisure through the GA Members area on the Website.

REPORT FROM COUNCIL

By: Diana Clements

With this issue of the GA Magazine you should receive an updated version of the Rules and List of Members. They include the Rules as revised in July 2018. In recent years Council has had to make a number of tweaks, mostly to the Regulations covering the Research Awards and our own prizes as criteria and relevant course details change. The most recent version is always posted on the website under 'About Us'. In the beginning of the booklet we list all the past officers, post-holders and Award Winners. This time we have added winners of the Halstead Award, introduced in 2016 and the President's Award which was first presented in 2017. We also decided to add in winners of the GA Student Symposium prizes, both for the presentations and the posters. Since 1991 when Bev Halstead died in a car crash whilst in office as President of the GA, Council has nominated a Halstead Lecturer in his honour. These were delivered annually at the British Science Association (BSA) Festival of Science. In 2017 BSA changed the criteria for choosing lecturers and could no longer guarantee a slot for the GA Halstead Lecturer so Council made the decision that they should be given as part of our own lecture series. The first GA Halstead Lecture was given in 2018 and these will also be listed in the Green Book from this date.

Figure 1: Amateur Geological Society's Mineral Gem and Fossil Show on 24th November, 2018

Council have been working hard to comply with new legal initiatives and further to the Data protection regulations (GDPR) circulated to members during 2018 have drawn up procedures for managing the personal data we hold. The Charity Commission details responsibilities for Trustees and from May this year we will give a short induction to new trustees prior to their first council meeting. We have been working on Protocols for Field Trips and these have been synthesised and incorporated into the Circular with fuller details sent to those who sign up. We are currently working on a Risk Register and Safeguarding initiatives.

The Annual General Meeting will be held before the President's address on Friday 3rd May, 2019. The Agenda can be found on p.33. Details of the Annual Dinner are shown on the same page. Do join us for this enjoyable social event. The Annual Report will be sent out to members in April, 2019. If you would like a paper copy please let Sarah know as soon as possible, otherwise we will send electronic copies to all those for whom we have email addressess. Please make sure that Sarah has your most recent email address, and if you have not already done so, please complete the Confirmation of Details form with your wishes of how you would like the GA to communicate with you and return to the office. It can be downloaded from this link: https://geologistsassociation.org.uk/ about, and sent electronically to the office. You will be sent the new password for the Members Page on the website in the letter accompanying the Annual Report. It will change on Friday 3rd May 2019, AGM day, so look out for it.

There are still some places left on the Shetland Trip. People enjoyed it so much last year that we decided to run it again this year. For those who have never looked at the geology of Shetland, I can personally recommend it as I have been on Allen Fraser's trip twice – it is the geology of Scotland in miniature, often with excellent exposures in the treeless islands. Details are in the Circular, along with our other trips. When organising trips, we have tried to link into recent GA Guides. The fourth edition of the *Guide to the Yorkshire Coast* (No. 34), is now on sale at £9 for members. The associated trip is led by the authors, Peter Rawson and John Write and will visit localities in the vicinity of Scarborough on 18th -19th May, 2019. The other trip is to the Devon coast led by John Cope and will be based in Totnes on 6th - 7th April, 2019. His Guide (No. 73) *The Geology of the South Devon Coast* was published in 2017 and also costs £9 to members. Details of all our trips for 2019 are detailed in the Circular on p.19. There are also details of trips organised by our local and affiliated groups. If you are not already a member of a local group, you might consider joining one. All of them are detailed in regions on the GA website with direct links so that you can find details of trips and talks on their individual websites if they are not detailed in the Circular. Roll on the more clement weather so that we can enjoy the trips that have been arranged for us!

We welcome the following new members to the Geologists' Association:

Elected December 2018 – March 2019

Gian Ameri	Ann Barlow	John Bates	Michael Bradley	Juan-Pablo Castaneda
Helen Farrelly	Tim Fedak	Richard Gordon	David Grayston	Richard Hallet
Simon Hunt	Harry Jones	Lucy Joy	Richard Messenger	Dudley Miles
Alex Gabriel Neches	Michel Ragody Hughes	Kathryn Riddington	Libby Robinson	Richard Robinson
Roy Smith	Lara Turner	Brian Robert Webster		

Deaths

During the past three months we have been made aware of the death of the following members:

Joseph Collins

Please notify us of any members that have died that you are aware of. We are always keen for short obituaries and/or a photograph - so if you feel you would like to write one, please get in touch with the office.

Evening Lecture: Minerals of the English Midlands

April, 4th 2019

By: Roy E. Starkey

The mineral wealth of the English Midlands has been exploited for centuries – lead, copper, zinc, and to a lesser extent silver, have all been worked. Deposits of coal, iron ore and limestone powered the Industrial Revolution, providing the raw materials for such visionaries as Sir Richard Arkwright, Matthew Boulton, James Watt, William Murdoch and Josiah Wedgwood.

The area has produced a wide range of interesting mineral specimens. Examples of these are to be found in local and regional museum collections, and especially at the Natural History Museum in London. However, such was the importance of Britain in the development of mineralogy as a science that specimens from the English Midlands are to be seen in collections all over the world.

Minerals such as phosgenite, matlockite and mottramite are recognised as having been first described from the English Midlands. Although the glory days of mining are long gone, quarrying operations, especially in Derbyshire, Gloucestershire, Leicestershire and Shropshire mean that fresh exposures are constantly being created, and new mineralogical discoveries continue to be made today.

Thanks to the efforts of miners, mineral dealers and collectors over the past few hundred years, interesting and beautiful specimens have been preserved for us to enjoy today. This talk will provide an overview of the fascinating stories associated with the mines, quarries and minerals, illustrated by images taken especially for a recently published book *Minerals of the English Midlands.*

Calcite on pyrite on Limestone. Hampstead Farm Quarry, Chipping Sodbury

GA COUNCIL **March, 2019**

OFFICERS

President:	**Nicholas Pierpoint president@geologistsassociation.org.uk**
Senior Vice-President:	**Dr Colin Prosser (Geoconservation)**
Vice Presidents:	**Professor David Bridgland (Chair of Publications Committee)**
	Dr Liam Gallagher (GA Magazine editor) gamagazine@geologistsassociation.org.uk
Treasurer:	**Dr Graham Williams treasurer@geologistsassociation.org.uk**
General Secretary:	**Diana Clements**

POSTHOLDERS

Curry Fund & Awards Committee: SchoolRocks!	**Dr Haydon Bailey**
Student Liason & Social Media:	**Dr Rebecca Bell**
Rockwatch Chairman:	**Susan Brown Rockwatch@geologistsassociation.org.uk**
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Secretary to Publications Committee:	**Prof. John Cosgrove**
Education Matters:	**Nikki Edwards**
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Archivist & Curry Fund Secretary:	**Dr Jonathan Larwood**
Meetings Secretary:	**Dr Michael Oates**
Librarian:	**Sara Osman**
Overseas Field Meetings Secretary:	**Dr Ian Sutton**
Co-opted: Guides Editor:	**Professor Susan Marriott**
Co-opted: Awards Panel Secretary:	**Barbara Cumbers awards@geologistsassociation.org.uk**

NON-COUNCIL POSTHOLDERS

Proceedings Editor-in-Chief:	**Prof. Malcolm Hart**
Executive Secretary:	**Sarah Stafford admin@geologistsassociation.org.uk**

ORDINARY MEMBERS OF COUNCIL

Alison Barraclough, Adrian Champion, Jon Clatworthy (co-opted 2018 conference), John Cooper (co-opted Facebook), Peter Jones (co-opted Conference 2019), Rhian Kendall, Gerald Lucy (co-opted Photo competition & fliers), Dr Lucia Perez-Diaz, Dr Thomas Phillips (co-opted student representative), Richard Trounson (co-opted for legal expertise), David Ward.

Council member due to retire in May is Rhian Kendall; Paul Olver retired earlier in the year. Colin Prosser retires as Senior Vice President and David Bridgland retires from the post of Vice President. Both remain as a Post-holders. Vanessa Banks has been nominated for Senior Vice President.

OBITUARY: Joe Collins (1927 - 2019)

Many of you who knew Joe Collins recognise what an amazing man he was: quiet, courteous, unassuming, fiercely independent with a wonderfully quirky sense of humour, never pushing for the limelight and yet, unbeknownst to many, an internationally recognised expert on British fossil crabs and barnacles and a highly respected amateur palaeontologist. His publication list was long and wide reaching. Many of his papers were published with internationally renowned colleagues, but more of this when his formal obituary is published.

I only came to know Joe during his later years, well into his retirement, when he spent many hours working with, and mentoring, colleagues at the Natural History Museum (NHM). He was always keen to share his enthusiasm and expertise and, as is often the case with the very old, had a special affinity with children. He offered to join our Rockwatch Team at the Lyme Regis Fossil Festival some few years after it became a regular, annual event. Joe soon became a much valued member of our group, travelling down to Lyme Regis year after year to join us, rarely accepting a lift from the station, let alone a car ride from London! It was only some time later that I learnt his early interest in palaeontology began on a school trip to Lyme Regis in 1939, so it was entirely appropriate that in retirement he offered to join the Rockwatch Team at the annual Fossil Festival there. The visiting children loved him and he really looked forward to the event, usually bringing a collection of special fossils for some of the children who visited him every year. I think he made many young friends at the Festival and I'm sure they will remember the knowledge and treasure the fossils that Joe gave them. I'm grateful to Claire Mellish, a special colleague of Joe's from the NMH for this little snippet: "He loved the event (Lyme Regis) and was so pleased with the accommodation arranged by you because it was near the front and his favourite fish and chip shop!" Rockwatch feels very privileged to have had Joe's expertise and enthusiasm given so freely to many youngsters at Lyme Regis and we feel sure that it will have sown the seeds in some of them to follow in his footsteps.

Joe joined the GA in 1953 and with 66 years membership behind him was one of the longest-serving members of the Association. One of the highlights of membership for him was the "Reunion", now badged as "The Festival of Geology" (FoG) and Joe never once missed exhibiting his amazing crustacean collection. More recently NHM colleagues, Claire Mellish and Jenny Parry helped Joe show his crustacean collection at the FoG. In 2018 he displayed his collection of crabs from Denmark; many people in the crab world knew that he would be there and came to talk to him. Joe will be sorely missed at FoG this year. In 2013, to mark the 60th year that Joe had exhibited, he was made an Honorary Life Member of the GA in acknowledgement of his unstinting support, commitment to palaeontology and willingness to share it with the general public. Much earlier, in 1971, when Joe had been a member for less than 20 years, he was awarded the Foulerton Award 'in recognition of his researches on fossil Decapoda and Cirripedia and paleontological demonstrations to the Association'.

I mentioned his quirky sense of humour earlier, and for me, this shone most brightly when he shared his latest 'saucy postcard' purchases with me at the GA's monthly lectures. I believe he'd amassed a huge collection of these and he always had a rather angelic smile when we met up to chat after the lecture to show me his latest purchases! Chatting did become more difficult for him latterly because of problems with his hearing aid which was frequently damaged, so meant we had to "speak very loudly." I think we added somewhat to the ambient noise in the Lower Library as we discussed his latest post cards!

To mark Joe's 90th birthday in September 2017, colleagues at the NHM organised a wonderful surprise party for him. It was a joyous occasion and I felt very privileged to be invited and greatly enjoyed sharing many happy memories of, and with, Joe and colleagues. Joe was 91 when he died and working to the very end. It seems he died peacefully in his bed. Joe, we will all miss you. Thank you for the memories.

It is hoped that an obituary of Joe, detailing his contribution to palaeontology, will be published in due course in the Proceedings of the Geologists' Association by his NHM colleagues Steve Donovan and Claire Mellish.

Susan Brown, & additional contributions from Di Clements

Presidential Address: Hydrocarbon Exploration is a Risky Business

May 3rd, 2019

By: Nicholas Pierpoint

In line with other mineral extraction activities the hydrocarbon industry has to overcome many risks, with geological risk being significant. Much effort in terms of technical resources are deployed to reduce the risks of drilling a prospect which is either dry, or has a sub economic hydrocarbon volume.

These risks are appreciated by the sub surface community; the challenge is to articulate the risk to other disciplines which are more comfortable working with less risk and uncertainty. An example - the risk is whether or not we find hydrocarbons - the uncertainty expresses the volume range of the prospect.

This presentation will examine geological risk from source to trap and how risk is conventionally expressed. Much focus is on the reservoir, but there are additional geohazards to be considered in the overburden which have to be overcome to enable the subsurface team to meet their technical well objectives.

In addition to the geological risk, there are environmental and political risks to consider, which can range from drilling in arctic oceans to piracy. All have to be assessed when making a decision to drill. There needs to be careful consideration of the well objectives and what questions require solving, which in turn impacts on the data acquisition programme, and potentially well design. These operations are not without significant risk.

By way of a 'safety moment'; a case study is used to illustrate how vital it is to fully assess accurately geological data near real-time. We will examine data recovered from a rig after a blow-out. The 'black box' data from the rigsite reveals drilling practices prior to the event, which reflects decisions based on a particular interpretation of the parameters. As new technology, and significantly enhanced health and safety practices have been adopted over the last 30 years, there are a number of safety gates which should be in place to prevent an uncontrolled release of hydrocarbons to the surface. Lessons from this incident have been shared across the drilling industry. Over 100km offshore and 300m water depth a drilling rig can feel a remote, and potentially vulnerable installation if things do not go to plan.

Given what we have observed is £1.30/litre of petrol a fair price?

Evening Lecture: Virtual Reality and Drone Mapping - Geological Applications of Immersive Learning

June 7th, 2019

By: Claudia Ruiz-Graham, Founder & CEO, Imaged Reality Ltd

The advance of new technologies such as high-resolution Drone Mapping, Virtual Reality, Mixed Reality, and Augmented Reality are changing the way we interact with the world. In this talk, we discuss the possibilities for immersive learning through Virtual Reality (VR), using digital outcrops from deep water and fluvial reservoirs derived from drone data. We also explore its application to geological field trips and to the interpretation of reservoir analogues for reservoir characterisation.

3D GAIA - Geological Interpretation in VR

One of the key advantages of adopting Virtual Reality to support learning and data analysis is that entire teams can have access to areas that would normally be too hazardous or too expensive to reach. It can also enable remote collaboration – connecting teams globally in the same VR session. Virtual Reality also improves knowledge capture by creating the option of field trip repeatability. This technology has a wide range of applications in subsurface learning, reservoir characterisation, environmental assessments, infrastructure planning, drilling & seismic operations and well site planning.

We have integrated drone mapping and Virtual Reality technologies to develop 3D GAIA, an application that enables geological field trips and direct interpretation of high-resolution digital outcrop models in Virtual Reality. Users have the ability to 'fly' over outcrops or 'walk' along these at real scale. 3DGAIA also integrates Google Earth, and other subsurface data, such as geology maps, seismic images and well log images. 3DGAIA's innovative solution enhances both depth and access to real-world experiences while significantly reducing training costs.

Evening Lecture: Cretaceous amber: bits of ancient ecosystems

July 5th, 2019

By: Ricardo Pérez-de la Fuente, Oxford University Museum of Natural History

Amber, fossilised plant resin, is a fossiliferous material with unique properties that has fascinated humanity since prehistoric times. Although amber is known since the Carboniferous and the oldest biological inclusions preserved within are Triassic in age, bioinclusion-rich amber does not become abundant until the Early Cretaceous, coinciding with a global warming period that promoted the resin production in different groups of conifers. Cretaceous amber is usually found in mudstones or sandstones related to delta-estuarine deposits, and it is often associated with charcoal and other plant matter. From the palaeontological standpoint, what makes amber special is that it offers an unmatched quality of preservation, potentially down to ultrastructural level, and provides direct evidence on behaviours and interactions between organisms as the resin captured small portions of the palaeoecosystem almost instantly. The organisms preserved in amber are usually small arthropods, namely insects and arachnids such as spiders and mites, but it also preserves microorganisms and small plant and vertebrate remains. This talk will be an opportunity to showcase how amber is gathered in the field and how its inclusions are prepared and studied in the laboratory through both classic and modern techniques. The study of Cretaceous amber and the bioinclusions preserved within provides valuable taxonomic, evolutionary, taphonomic, and palaeoecological data, such as on camouflage and host-parasite or pollination relationships.

Amber excavation at the San Just outcrop (Teruel, Spain), Early Cretaceous (*c.*105Ma)

GASS 2019

Geologists' Association Student Symposium

Geological solutions to global challenges; What difference will your research make?

17th of May 2019

Burlington House, Piccadilly, London, W1J0BG

- ***Prizes** will be awarded for the best oral and poster presentations.*
- *Confirmed keynote speaker: **Professor Iain Stewart** (Director of the Sustainable Earth Institute, Plymouth University)*
- *Registration **opens 1/1/19***
- *Abstract deadline: 22/03/2019*

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Festival of Geology, Walk: Building Stones Walk - from Hyde Park Corner Station to Green Park Station

4th November, 2018

Leader: Dr Matt Loader, Natural History Museum

By: Diana Clements

I write this as I learn that the Bomber Command Monument at Hyde Park Corner has been vandalised by white paint. For Matt this monument has a personal family significance and so it was particularly apt that we should visit it. It took until 2012 for the monument to be created because of the controversy about whether Bomber Command should be commemorated. It is a fitting memorial in bronze of an air crew with remains of a bombed plane incorporated into the roof. The men are mounted on a purple plinth of Imperial Porphery - the word porphery translates as purple but for geologists the meaning is different. Matt is an expert on igneous petrology so was able to enlighten us. It was interesting to compare the newly-constructed surrounds in Portland Stone to the Royal Artillery Memorial that we had examined earlier. That too had family connections for Matt. The memorial was completed in 1925 and in nearly 100 years dissolution of the limestone was apparent with some of the oysters standing proud.

Figure 1: Matt Loader enthusing over the Laguna Verde stone of the Australian War Memorial

Matt's favourite stone within the Hyde Park Corner Memorials is the Laguna Verde Monzonite of the Australian War Memorial, appropriately sourced from Australia. When constructed, water flowed down the face of the monument over the names of those who gave their lives; it is sad that this seems to have stopped, as, apart from anything else, it showed off the stone to great advantage. We also examined Peterhead Granite in the Duke of Wellington Memorial and the granite of the Canadian War Memorial within Green Park. This stone is Anticosti Granite (actually a charnikite) from Canada incorporating maple leaf sculptures in bronze in the design. Here the water is still flowing over it to great effect. Details of the memorials and the stones can be found in Ruth Siddall's write up of her Urban Geology trails (Itinerary 4): www.ucl.ac.uk/~ucfbrxs/Homepage/UrbanGeology.htm.

Many thanks to Matt for sharing his enthusiasm with us and for enlightening us about the details of the stones examined.

Festival of Geology, Walk: Geotrail around Greenwich Park

4th November, 2018

Leaders: Members of the London Geodiversity Partnership

By: Diana Clements

Several of the morning group were sufficiently enthusiastic to come to Greenwich Park for the geotrail in the afternoon. This walk was devised by the London Geodiversity Partnership (LGP) after being invited by the Royal Parks to contribute information on the geology for their forthcoming Lottery bid. Within the Park four different geological strata are represented with two others underlying the area closer to the Thames. Starting at the Cutty Sark we were able to walk our way up the succession. The steep slope of the Lambeth Group gives rise to numerous springs from the alternating sand and clay layers. In the past these were an important source of water for the area, channelled through the Standard Reservoir. The building still stands and we were able to locate some of the springs in the slope behind. At the top of the hill we were on the Blackheath plateau which extends from Blackheath in the west to Erith in the east. We examined the pebbles in 'The Dell' a former small quarry, and discussed the extensive former workings on the adjacent Blackheath (named after the pebbles). LGP suggested to Royal Parks that this would be a suitable place to reveal a permanent section that could be included in the Lottery bid. We finished in the twilight at the magnificent viewpoint over the Thames.

Figure 1: The group discussing springs at the Standard Reservoir

LGP has written up the walk to add to the geotrails on their website. We hope it will be there soon so keep your eye on: http://londongeopartnership.org.uk. It has already been recognised as a LIGS (Locally Important Geological Site), *GLA 73.*

Geologists' Association Annual Conference 2018: The Geology of 'Mordor'

20th October 2018

By: Lesley Exton

This year's conference in Birmingham was opened by our President Nick Pierpoint. Since it's inception in 2000 the annual conference has been held in various locations around the country, from Durham to the Isle of Portland. There are a few gaps and we will be filling one of these next year when we will be in Manchester, 19th - 20th October 2019 - *'Geological Resources of the North West England: Past, Present and Future'.*

A lot of people know Mordor as J.R.R. Tolkien's fictional world of Middle-earth in the *Lord of the Rings* books, the realm and base of Sauron. For those of you who don't know in Elvish, Mor-Dor means dark or black land. Tolkien was brought up during the 1890's in nearby rural Hall Green, now a Birmingham suburb. He would have seen what 13-year-old Princess Victoria had done 60 years earlier. When after travelling through the pits, steelworks, blast furnaces and forges in the industrialised area north-west of Birmingham she recorded in her diary "The country is very desolate everywhere. There are coals about and the grass is quite blasted and black. The men, women, children, country and houses are all black … but I cannot by any description give an idea of its strange and extraordinary appearance." The land was black by day and red by night as the fires never went out and it is thought Tolkien used this as the basis for Mordor.

This was the Black Country, but where is it? It has always been said that the easiest way to start a fight in a Black Country pub is to ask for a definition. One is that it is the four boroughs of Wolverhampton, Walsall, Sandwell and Dudley; another is it is the area encompassed by the '30-foot' coal seam. Which ever you use the 19th Century established the Black Country with it's enormous wealth of coal, ironstone, limestone, fireclay, soft sandstone and brick clays as the 'workshop of the world' and nearby Birmingham as the 'city of 1000 trades'. This created the world's first industrial conurbation based entirely on the exceptional geological resource of the region and the ingenuity of local people.

The morning's session was chaired by Dr Colin Prosser and the first speaker was Graham Worton from Dudley Museum who examined the natural and cultural heritage legacy of Mordor, now the furnaces have gone out and the mining has ceased. It is a unique global asset and he outlined its bid to become an UNESCO Global Geopark.

Figure 1: The Joseph Chamberlain Memorial Clock Tower, or simply Old Joe, is a clock tower and campanile located in Chancellor's court at the University of Birmingham

Figure 2: Graham Worton

This was followed by Oliver Wakefield, from BGS, who provided an overview of the landscape of the Black Country during key geological periods. Starting in the Silurian, when sub-tropical oceanic conditions prevailed, through to the warm equatorial period of the Carboniferous, progressing into the inhospitable arid desert-like Permian and Triassic periods, all the way to the relatively recent cold glacial and periglacial periods and culminating in modern day looking at the human impact and interactions with the landscape.

Colin Knipe, of Johnson Poole & Bloomer, then looked at mining in the area, which had the thickest seams of coal in Britain. The miners had to devise special ways of working such thick seams, and cope with the spontaneous combustion of methane gas and the threat of flooding. Explosives were extensively used in the limestone mines but blasting accidents were common. Underground mining caused major surface subsidence and property damage, so millions of tons of mining spoil, ash, cinder, slag and other industrial wastes were tipped on the surface to build up the levels. The mining industry also left a legacy of thousands of old mineshafts.

In the final session of the morning Lil Stevens, from the Natural History Museum, introduced us to the Carboniferous fossil plants and animals that have been found at Coseley, north of Dudley. Contained within ironstone nodules and showing extraordinary soft tissue preservation this has allowed detailed characterisation of whole plants and floras from the early Westphalian-age (late Bashkirian). Although the site at Coseley is no longer accessible there are a large number of these nodules in museums around the country and a review of this flora in light of current knowledge and techniques in palaeobotanical research is overdue.

Before we broke for lunch, those with posters had two minutes each to give the audience a brief synopsis of their poster. These included the Geologists' Association's adventures in Mordor over the past 150 years, William Smith's travelling map on tour (which those of us on two of the field trips on Sunday would see), a personal look at an ancestors industrial heritage, evidence of an impact origin for the Kas Bay structure (Turkey/Greece), Earth Heritage magazine at 50, the Black Country UNESCO Global Geopark Project and the Black Country Geological Society. The posters were on display on the first floor behind the lunch, there were also a number of exhibitors.

The afternoon's session was chaired by Graham Worton. We heard first from Elizabeth Withington, from Stantec, on cleaning up the legacy of Mordor. Using a series of examples she looked at what has been left behind both chemically and physically in the earth, water and air. How these can affect the current inhabitants. What needs to be considered when looking at reusing a site. What needs to be done to make a site usable and how this has changed since the legislation was first put in place.

Figure 3: Detailed appreciation of William Smith's map No. B22

Ben Evans, from the National Museum Wales, then described a British Institute for Geological Conservation project in South Wales, TIPical valleys. For many years the scarred landscape of the once industrialised valleys has been planted and the tips have been removed and reclaimed in the name of progress. Increasingly, however spoil tips and their associated features are being seen as an important, highly valuable and an increasingly scarce resource. This project aims to inspire and engage communities of the South Wales Coalfield, challenging the misconceptions surrounding mineral spoil landscapes and reintroducing them to their geology, biodiversity and heritage. Ultimately through education, research and sympathetic community management, the aim is to raise the profile of mineral spoil highlighting its importance as an invaluable biological, geological and heritage resource.

Figure 4: The author creating crinoids during the Supper time Quiz & crafts!

We were then whisked away from the solid rock of the "primary world" we all live in, into the geologies of the imagination by Will Tattersdill, Senior Lecturer in Popular Literature, at the University of Birmingham. These "secondary worlds" are sub-created places of a writer's imagination like Middle Earth, Utopia or the Star Wars galaxy. These worlds have geologies of their own, some more rigorously consistent with primary-world science than others. Focusing on J.R.R. Tolkien's fictional world of Middle-earth he looked at how authors deployed geological knowledge and science when creating their worlds. Sometimes sitting on the fence as Tolkien did as regards plate tectonics to ensure their "secondary worlds" survived for future generations.

Finally, Paul Smith, of the University of Oxford, turned back the clock 430 My and took us to a tropical paradise, that then existed in Dudley and Shropshire. At this time an extensive reef system stretched across the Midland Platform with a complex, coral - framed, reef ecosystem with high biodiversity. Well over 600 species are recorded in the reefs and adjacent limestones, including tabulate corals, bryozans and stromatolites (calcareous sponges) with some stromatolites made up of cyanobacteria. Crinoids formed an important part of the ecosystems and a wide range of invertebrates lived within the irregular, intricately three-dimensional landscape formed by the biomineralised framework. Study of some of the rarer elements of the fauna have advanced understanding of the reef ecosystem and its responses to sea-level change.

For those of us dining with dinosaurs at the Lapworth Museum of Geology that evening the day was not yet over. An enjoyable evening was had, which not only included a good meal and company but also a geological quiz and the chance to show off your artistic ability with the creation of a Silurian Ocean diorama.

Evening Lecture Report: Control the drainage: the Gospel accorded to Sinkholes

4th January, 2019

By: Tony Waltham

A version of this lecture as the Glossop Lecture aimed at the Engineering Group of the Geological Society was presented in this room, a few years ago. Tony has modified it a little since but it is basically talking about sinkholes as a geohazard or as a geomorphologist would call it, a doline as a geohazard.

It is all about karst and as geologists we should know what that is. Karst is an environment, limestones and residual soils, which cause problems for the engineer. Karst comes in various forms, they all have holes in the ground and a shortage of surface water as it has gone underground. The reason there is no surface drainage is because there are caves below ground. Holes in the ground are important for engineers as they have very low load bearing capacity!

Basically, caves are a disaster for engineers. Occasionally they are useful, e.g. the French ran a road through an existing cave in the foot hills of the Pyrenees and the Americans ran a railway through a cave in Virginia, to save digging a tunnel. But normally they cause problems, like the Cong canal built in Ireland, near Galway. The channel runs through cavernous limestone rock for its entire length and the water just drained away.

A quarry face from Turkey showed the haphazard system of fissures which are in the limestone. That is what causes the problem, particularly when you have a soil cover sitting on top of it because then you have the potential for soil going down into the limestone creating a sinkhole. That is the type of sinkhole which is the main hazard in karst regions . It is nothing to do with limestone collapse, it is to do with soil being washed down into fissures and they occur anywhere.

There are six different type of sinkholes, solution, buried, collapse, caprock, subsidence (dropout) and subsidence (suffosion). The first four involve rock collapse, however, the two we are interested in are the subsidence sinkholes where there is thick soil cover and the sinkhole develops in the soil due to the soil being washed down into the fissures below. That is the key process. The fissure takes ten thousand years to form, the soil can get washed down in a single rain storm. This then brings the whole process into the engineering timescale and makes it a hazard rather than an interesting geological feature. The subsidence dropout sinkhole is formed in a cohesive soil. The soil drops out from underneath, you get a soil cavity developing and then the whole thing collapses quite suddenly. If you have a non-cohesive soil, it acts like an old-fashioned sand egg timer producing a subsidence suffusion sinkhole. Those are the two extremes of a spectrum of situations that are involved in the various stages of collapse and subsidence in forming a sinkhole.

Occasionally you can see the whole sinkhole and what is going on underneath. Marble Pot sinkhole up on Ingleburgh is large enough so you can get into and see what is going on. It is a classic sinkhole with the sides slumping in, however the fissures down below are large enough to get into, at least if you are a small mad caver and consequently we know what it looks like underneath. A cross section through a series of sinkholes there showed the patterns of fissures and bedding planes opening and the cave system going down underneath. Normally it is on a smaller scale and we don't get to see it. It also shows a sinkhole will occur whenever there is a fissure in the limestone. But you don't where they will occur.

So, when you get a whole bunch of them e.g. Ripplehead in the Dales, an area of glacial till with sinkholes all over the place where will the next one occur? This is what engineers want to know, it will be where there is another fissure – which we can't see! Sometimes you can see a line of sinkholes which indicates that there is a fault underground, but in many cases there won't be any indication. So you can not predict the location of the next sinkhole. But you can predict it will occur when some water washes the soil down.

This is the whole thing about the water situation. One single rainstorm is enough to disturb the equilibrium. Normally the disturbance of the water system is done by civil engineers. The main cause of sinkholes forming is a leaking pipe, which washes the soil down, the pipe can then burst, causing much more soil to be washed down. Sinkholes can also occur in chalk or gypsum if the situation is right.

Buried pipelines can also cause problems. The problem with putting a buried trench in karst is the pipeline engineer puts in a seating of gravel to lie the pipe on. This is perfect drain, it gathers the water from all over the place so unless there are trench breakers and drainage of the trench this will cause problems. That is why in urban areas the sinkholes are commonly along the roads as that is where the drains are. After giving a few good examples from around the world he then moved onto a sagging building. In this case engineers hadn't put piles down to the bedrock 10-20m down but had put the foundations in the glacial till above. There was some soil movement and a pipeline broke on the other side of the building, that created a sinkhole, which took out a water main under the road, the escaping water took out the soil from beneath the foundations on the opposite side and wrote off the building! Other examples included houses being damaged by sinkholes caused by a leaking septic tank and a swimming pool.

Tony then looked at the case of a man who had died in

Florida a few years ago when a sinkhole opened up in the night under the house and he went down it. From the photos at the time it looked like it was caused by a leaking pipe or drain, however, in looking at photos from GoogleEarth there is a soakaway 30m behind the house. It could well be that water from this pond was going under the house. The house and both the neighbouring houses were subsequently knocked down, the sinkhole filled in and grassed over, however, the sinkhole has reoccurred. After several more examples in the USA he moved onto one in China.

In Guizhou, China they were looking to build a new town and put down a series of wells into alluviated karst to obtain a water supply, this lowered the water table and caused clusters of sinkholes to appear around the wells. They had 12,000 new sinkholes in the first seven years they were there. Right in the middle of each conal depression was the pump house, three of them had already self destructed by the time Tony got there. In another example from Pennsylvania, pumping at a local quarry caused numerous sinkholes in the surrounding area, including the small community of Brookwood. In the end the quarry brought up all the houses and everyone moved out.

After the flooding of a gold mine in the Rand in the 1960's, the mining companies decided to drain the area and took all the water out of the limestone above, this was dropping the water table on an unprecedented scale and consequently they got an unprecedented number of sinkholes, including one which took out the crushing plan of the mine and killed the 29 workers inside. The entire 5,000 population of the town of Bank was also evacuated as houses were collapsing all over. The only thing that wasn't abandoned in the area was the railway line which was kept open for freight. After 10 years when things seem to have settled down they reopened up the railway line, eight days later they got a sinkhole under the line.

A limestone cave is basically a void in the rock, the majority of them are deep enough that they are stable. However, if you have a large cave at a shallow depth then there is the potential for a problem. If you then have a situation where the beds can drop bed by bed the cavity can migrate upwards. But how thick does a roof have to be? Tony had done tests on sandstone in Nottingham, however, limestone is not homogeneous like sandstone so is difficult to model what will happen. Dave Redditch and his team have developed a system using rock mass rating, limestone data was then put in to the model to give data on fractured limestone of different strengths and degrees of fracturing. So now have some idea of when rock will stand over a roof or cavity so can apply this to site investigation.

If you know where the cave is you can take account of it in the build and Tony showed some successful builds together with an one where the advice had been ignored and a sinkhole took the road junction out a year after it was built. But if you don't know where the cave is, it is almost impossible to predict the nature of cavities in limestone, even if you put a grid of bore holes down, which was demonstrated by examples in the Pennines and the Remouchamps viaduct in Belgium.

He finished by looking at how big a cave can get. The largest in the world is Sarawak Chamber which is 700 m long and 400 m wide. And sinkholes? In China there is one 400m wide and 300m deep.

By: Lesley Exton

Book Review: Fossils of Morocco; Volume 1. Emblematic localities from the Palaeozoic of the Anti-Atlas

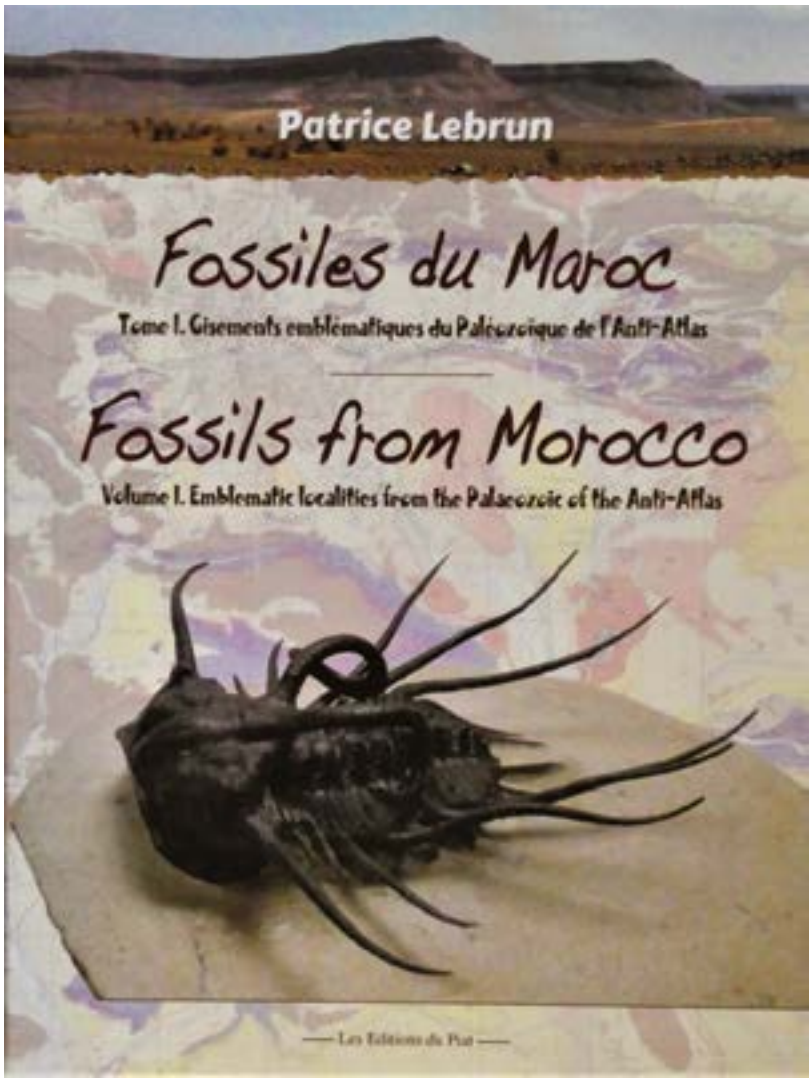
By: Patrice Lebrun, Publisher: Piat (Editions du)

This glossy, superbly illustrated, A4-sized hardback book is Volume 1 and covers the Palaeozoic geology and fossils of the Anti-Atlas area in Morocco. Many of the sites and fossils will be familiar to anybody who has been on one of the many geo-tours to this area and I would thoroughly recommend this book for those people in particular or those planning to go to Morocco. Volume 2, scheduled for publication in June 2020, will cover the Mesozoic and Caenozoic localities of the Anti-Atlas as well as the Palaeogene of Dukhla, and the phosphates from the Khouribga area. The current 298-page book is bi-lingual with the original in French, but the English translation is very well-presented.

Of the nine chapters, the first few cover the author's introduction to Morocco and his subsequent passion for its geology and fossils, and an outline of the country's geology and palaeontology. This is then followed by chapters on the Cambrian trilobites, the 'proliferation' of Ordovician invertebrates, the Silurian, Devonian (yet more trilobites) and the Carboniferous. Many particular sites are covered in more detail. These include the areas around Tazemmourt, Issofen and Jbel Ougnate (Cambrian trilobites), Zagora, Agdz, Tazzarine, Battou, Arfoud (Ordovician), Arfoud (Silurian cephalopods and crinoids), and the Dra Valley, Jbel Issoumour, Taouz, Tafilalt (Devonian, mainly trilobites).

Admittedly, I have yet to to read the full volume but dabbling in and out works well because of the way in which the text is organised. It is full of fascinating scientific detail, superbly translated into English, and includes probably everything you would want to know about the palaeogeography, geology, sites and fossils. But it is the illustrations that impress most. From aerial photographs to details of trilobite eyes, the book also includes photographs of every type of fossil that you would probably collect (or purchase) on a trip to Morocco. Of course, the many highly ornamented Devonian trilobites probably have the greatest 'wow-factor' and fill many of the pages, but goniatites, ammonites and brachiopods make an appearance as well.

I do not have the expertise to comment on the technical content, but it all looks very good. My one and only issue with the book is the readability of the Contents and Foreword. The text of the latter, in tiny grey font, is presented in front of a washed-out image of a hillside. The contrast and small print make it almost unreadable. The Contents list, in a script-like font which is the same as used on the book's cover, is also difficult to read as the English text is in pale brown – again not good if you have any visual impairment. These criticisms, however, are trivial and the book would well serve the interests of anybody interested in the geology and fossils of Morocco. I look forward to the appearance of Volume 2.



Reference

Lebrun, Patrice. 2018. Fossiles du Maroc. Tome 1. Gisements emblématiques du Paléozïque de I'Anti-Atlas. /

Fossils from Morocco. Volume 1. Emblematic localities from the Palaeozoic of the Anti-Atlas. Publisher: Piat (Editions du).

Available from NHBS, price £91.99 + £7.50 postage or Piat's website, Minéraux & Fossiles, at €50.00 + €18.00 postage.

By: David Bone

Location Report:The Chicxulub Impact Crater, Mexico

21st October, 2018

By: David Bone

'El Grand Museo del Mundo Maya' or, in English, 'The Grand Museum of the Mayan World', is in the city of Mérida in the Yucatan state of Mexico (See Figure 1). This is the place to visit if you are in the east of Mexico and weary of visiting ancient Mayan cities and climbing pyramids, or have had enough of bathing in the sea at Cancun. The museum has an amazing archaeological collection of material from the Mayan culture, which alone is well worth a visit. It also has a gallery that tells the story of the impact crater centred on Chicxulub, about 15 km north-east of Mérida (See Figure 2), and the meteorite, 65 million years ago, that marked the end of the Cretaceous period and pushed the dinosaurs to extinction – 'Chicxulub, el fin de los dinosaurios'.

Figure 1: Exterior view of the El Grand Museo del Mundo Maya, Mérida (Photo, Anne Bone)

Mérida is the capital and largest city in Yucatan, located about 35 km from the coast of the Gulf of Mexico and 275 km west of Cancun. It has a population of around 900,000 of which 60% have Mayan ethnicity. It was, therefore, the ideal place to construct the museum of Mayan culture, which was opened in 2012. Of the three floors in the museum, the ground floor is dedicated to the exhibitions. These start with a superbly presented animated film projected on a large surround-screen. It commences with showing the abundant life in the seas of the late Cretaceous whilst dinosaurs roamed the land, moving on to a simulation of an incoming meteorite and its impact, and the resulting global devastation. The film concludes with the return of the rainforest and the rise of the mammals. Whilst the dialogue is in Spanish, the dramatic imagery is more than sufficient to tell the story. The rest of this gallery takes the visitor through the origin of life, evolution, the meteorite impact and geology. Most of the captions are bilingual in Spanish and English, making the exhibition very accessible. The displays include specimens but also many illustrative diagrams and reconstructions (See Figures 3, 4 & 5).

Figure 2: Museum map showing the location of the Chicxulub impact crater

Figure 3: Introductory gallery in the museum (Photo, David Bone)

Life on Earth has experienced five major extinctions in which more than 90% of the species alive at that time have been lost. The last major extinction took place at the end of the Mesozoic era, where a rock layer at the Cretaceous – Tertiary boundary is relatively rich in iridium, a metal that is abundant in extra-terrestrial rocks. The iridium occurs in higher concentrations around the Gulf of Mexico and the Caribbean Sea, so a large meteorite or asteroid was

Figure 4: Dinosaur, *Utahraptor*, reconstructions (Photo, Anne Bone)

Figure 5: Museum panorama and fossil display cases (Photo, David Bone)

suggested to have impacted the Yucatan area, causing the global extinction. Geological exploration eventually revealed the shape of a large crater, 150 km in diameter and 20 km deep, buried under 600 m or more of later sediments and confirmed by a drilling project in 2016. The impact centre lies deep beneath the small town of Chicxulub on the north-west coast, hence the name given to the event. It has been calculated that the impact would have created a tsunami over 100 m high and produced a dust cloud that circled the globe for several years, changing the climate. Recent research suggests that there may have been simultaneous smaller impacts on the Earth's surface, resulting from break-up of the meteorite as it entered the atmosphere.

Around 20 million years ago, the Yucatan Peninsula emerged from the sea. The present land surface is formed of a relatively thin and flat stone layer, known as 'chaltun' in Mayan. Beneath this hard layer is a great thickness of softer limestone, 'sascab', that acts as a sponge with an enormous capacity to store rainwater. Without this reservoir, the region would resemble a savannah with wet and dry seasons, rather than the rainforest that covers the peninsula today. Beneath the dense vegetation cover (See Figure 6) the limestone is eroded into a karst landscape of sinkholes ('cenotes'; Figure 7), caves and an extensive network of underground rivers. The longest so far explored is 244 km long and connects with 140 cenotes. Some of the cenotes were used by the Maya as ritual sites, more recently others have been made accessible for swimming, scuba diving and wire rope sports. Stalactites and submerged cave formations makes the cenote dives particularly interesting. In north-west Yucatan, there is an interesting circular ring of cenotes. It has now been shown that these have formed where the groundwater flow has been deflected around the crater rim to eventually flow into the Gulf of Mexico.

An exceptionally well-presented museum and worth a visit, but it is quite some distance outside the city centre and transport is essential. I have just two complaints – the shop is not run by the museum and only stocks the usual tourist stuff, but more expensive, and no museum publications whilst the café on the top floor is pretty basic. But don't let that deter you – the air conditioning is a great relief from the exterior heat.

Figure 6: The temple pyramid at Uxmal, deep in the Yucatan rainforest (Photo, David Bone)

Figure 7: A typical Yucatan cenote (Photo, Jess Bone)

Circular No 1019 March 2019

SAFETY IS TAKEN VERY SERIOUSLY should you be unsure about either the risks involved or your ability to participate safely in any of our events, you must seek advice from the GA office before booking. Please make sure that you study any risk assessment or safety briefing and that you have all the safety equipment specified. You must declare, at the time of booking, any disabilities or medical conditions that may affect your ability to safely attend a field meeting. You may be asked to provide further information on any prescription drugs etc that you may use whilst attending a field meeting. In order to ensure the safety of all participants, the GA reserves the right to limit or refuse attendance at field meetings.
EMERGENCY CONTACT if you are lost or late for the start of a meeting, an emergency contact is available during UK field meetings by calling the GA mobile phone **07724 133290.** The mobile phone will only be switched on just before and during field meetings. For routine enquiries please call the GA office on the usual number.
TRANSPORT is normally via private car unless otherwise advertised. If you are a rail traveller, it may be possible for the GA office to arrange for another member to provide a lift or collect you from the nearest railway station. This service cannot be guaranteed, but please ask before booking. Please indicate when booking, if you are able to offer a lift.
PUBLIC LIABILITY INSURANCE for field meetings is provided but personal accident cover remains the responsibility of the participant. Further details are available on request from the GA office.
TRAVEL REGULATIONS are observed. The GA acts as a retail agent for ATOL holders in respect of air flights included in field meetings. All flights are ATOL protected by the Civil Aviation Authority. Field meetings of more than 24 hours duration or including accommodation are subject to the Package Travel Regulations 1992. The information provided does not constitute a brochure under these Regulations.
Graham Hickman arranges UK field meetings and Ian Sutton is responsible for overseas excursions. Website for further details
https://geologistsassociation.org.uk/ukfield: https://geologistsassociation.org.uk/overseasfield
BOOKINGS AND PAYMENT: These should be made through Sarah by email: fieldmeetings@geologistsassociation.org.uk phone 020 7434 9298 or through the GA website. Please give an email and emergency contact number. Unless otherwise stated the cost is £5 per day for members. Locations and timings of field trips will be given nearer the time and once payment has been received. Field meetings are open to non-members but subject to £5 per day on top of the normal administration fee. The surcharge for overseas field trips will be equivalent to a year's Membership of the GA which we would recommend is used as membership for that year. (Associate £30, top-up for Joint £25 or £20, Student £20). Priority will initially be given to GA Members. Book online or cheques should be made out to Geologists' Association. Where places are limited, a system of first come, first served will operate so do book early. Some meetings may have restrictions on age (especially for under 16s) or be physically demanding. If you are uncertain, please ask.

GA UK FIELD MEETINGS 2019

Saturday 6 & Sunday 7 April
GA Devon Weekend Field Trip
Leader: Prof John Cope
Location: Totnes, South Devon
This weekend trip will examine the Devonian and Permian rocks south of Torbay and towards Start Point. Starting with the Devonian succession, near Brixham, including stromatoporoid reef limestones with local fissure-filling infills of Permian red-beds.
Attendees to arrange their own accommodation. Totnes is recommended as this would avoid using the Dart Ferry or an inland detour.
Meeting points and further details will be communicated to participants nearer the time.
Cost: £10 GA Members

Saturday 18 & Sunday 19 May
GA Yorkshire Coast weekend fieldtrip
Leaders: Prof Peter Rawson & Dr John Wright
This GA weekend Field Trip is being held to celebrate the planned publication of a new edition of GA Guide 34, "The Yorkshire Coast", and forms part of "Yorkshire Geology Month". Jurassic, Cretaceous and Pleistocene localities in the vicinity of Scarborough will be visited, and members should book accommodation in Scarborough, where there is a wide range of hotels and B&Bs.
Meeting points and further details will be communicated to participants nearer the time. Participants are responsible for booking their own accommodation.
Cost: £10 GA members

Sunday 28 July
The Wealden Excursion
Leaders: Peter Austen & Ed Jarzembowski
Location: Wealden – exact location to be decided. This trip continues the popular annual Wealden excursions and again will visit one of the sites in the Weald Clay of south-east England. The venue will be confirmed later so as to take advantage of conditions at the time. Attendees will need to be sure they can safely cope with the conditions to be found in working quarries.
Meeting points and further details will be communicated to participants nearer the time.
Cost: £5

Friday 20 September - afternoon
Behind the scenes geology store tour
Bristol Museum & Art Gallery, Bristol
Leader: Debbie Hutchinson
During 2019 we hope to celebrate the publication of the new GA guide to the geology of the Bristol area. This trip will take a 'behind the scenes tour of the library and geology store' at the Bristol Museum and Art Gallery revealing some of the unseen treasures. We are limited to a maximum tour size of 10 people, however it can be run more than once in the afternoon if required.
Attendees wishing to stay on and make a weekend of it by attending the field trip on Saturday 21st should arrange their own accommodation and sign up to that event separately.
Meeting points and further details will be communicated to participants nearer the time.
Please note access to the geology store requires negotiating a stairway of 10-15 steps, there is no wheelchair access. However, for access to the library on the second floor a lift is available.
Cost: £5 will be same for both members and non-members

Saturday 21 September
Jurassic geology around Bath/Bristol, Bath
Leader: Prof Maurice Tucker
Prof Maurice Tucker is one of the authors, in the soon to be published and updated, GA guide to the geology of the Bristol area. The Saturday trip will visit Brown's Folly near Bath and Midford to examine the rocks of the Great Oolite Group and Inferior Oolite.
Attendees wishing to take the 'behind the scenes tour of the library and geology store' at the Bristol Museum and Art Gallery' on the Friday afternoon before hand (20/9) should arrange their own accommodation and sign up to that event separately.
Meeting points and further details will be communicated to participants nearer the time.
Cost: Members £5

OVERSEAS FIELD MEETINGS
2019
Shetland
Tuesday 4 -Tuesday 11 June
Leaders: Allen Fraser
The whole trip will be based in Lerwick on Mainland (Shetland's largest island) and begin with an introduction to Shetland geology. On the following days we will: traverse the metamorphic and granitic rocks of Central Mainland; visit the Ophiolite nappe on the island of Unst. In South Mainland we will: see Upper Dalradian phyllites, meta-volcanics a massive sulphide deposit and Viking soapstone quarries; in the Devonian basin of South Mainland we will find desert dune, alluvial fan, river and lake sediments with fish fossils. In North Mainland we will: see evidence of the Storegga Slide tsunami and visit the best exposure of the Great Glen Fault in Britain as well as quarries in the Northaven Plutonic Complex; a whole day will be devoted to exposures of a Devonian volcano on Esha Ness. Generally there will be evidence of glacial activity and rapid sea level rise including St. Ninian's Isle sand tombolo.**Cost and Booking:** Estimated cost based on minimum numbers is Twin /Double £615 Single £755. Accommodation is bed and breakfast at the Glen Orchy Guest House in Lerwick. Numbers above will result in a decrease of the total cost. Also included are the services of Allen. Transport by minibus, inter island ferry charges and entrance fees to Unst Heritage Centre.
Contact Sarah@geologistsassociation.org.uk

2020
Geological and Archaeological trip to the Teke Peninsula of Lycia in Southern Turkey
15 - 25 April
Leaders: Professor David Bridgland, Dr Robert Westaway and Alison Ure
This successful and popular trip has been run 3 times previously by OUGS, and this will be the third time David and Rob have led it. A write up in the OUGS national newsletter September 2014 can be accessed through the OUGS website. The area covered is the Lycian Region of South West Turkey, an area laid down in Cretaceous times and shaped by the closure of the Tethys Ocean thrusting ocean floor overland in two opposing directions. The trip has been extended by a day from the previous trips, to incorporate evidence of the recent discovery of a meteorite impact, creating the formation of Kaş Bay. If you have never visited Turkey before this is an excellent opportunity to discover the fabulous hospitality of the people, great food, fascinating cultural and archaeological history, along with an

array of very interesting geological features. Oh and then there is the weather!!
Information on the hotels and most of the sites mentioned in the itinerary below can be found on line. A more comprehensive itinerary will be sent later.
Suggested reading 'Archaeology and Geology of Lycia Southern Turkey' by Dr Jill Eyers. (Rocks Afoot field guide series)
Cost will be dependent on numbers in the group, and may be subject to change. The approximate cost will be £860 per person for minimum of 10 persons and £695 per person for a maximum of 20 persons. This price does not include flights and is based on shared accommodation. This price does include 10 nights B&B, transfers to and from the airport (if arriving with the main group) 2 dinners and 1 lunch, coach and driver, Turkish guide and three leaders, and entry to all ancient sites. A single supplement of £100 will be added for those not wanting shared accommodation.
A minimum of 10 people is needed to make this trip viable.
Personal travel insurance is a necessity for this trip however Turkey is deemed as being in Europe with most insurance companies!
A visa will be required but this is a 2 minute online process costing around 20$.
Please note that despite recent political issues in Turkey the area visited on this trip is very safe and is a long way away from any troublesome borders, and the current exchange rate is very favourable for English visitors.
Booking: To register your interest please email: admin@geologistsassociation.org.uk

GROUPS (LG) & AFFILIATED SOCIETIES

Amateur Geological Society
http://amgeosoc.wordpress.com
starfields@tiscali.co.uk
March 12 The seven geological wonders of Hertfordshire – Mike Howgate.
April 9 Canyonlands of the Colorado Plateau – Dr Tony Waltham.
Association of Welsh RIGS Groups
www.wcva.org.uk/members-partners/nvo-search/detail?id=906675
Avon RIGS
http://avonrigsoutcrop.blogspot.co.uk/
Bath Geological Society
www.bathgeolsoc.org.uk
May 4 Field meeting to Kimmeridge Bay
Bedfordshire Geology Group
www.bedfordshiregeologygroup.org.uk
Belfast Geologists' Society
www.belfastgeologists.org.uk
Black Country Geological Society
www.bcgs.info
Brighton & Hove Geological Society
www.bhgs.org
March 3 Field meeting: Pevensey In Spring.
March 6 Mount Erebus, Ross Island, Antarctica – Dr Dial Peters.
March 20 - AGM & Members Evening
April 3 Arthropod Evolution: integrating fossil and living Evidence – Dr Greg Edgecombe.
April 11 Field meeting: Twilight Brighton.
May 5 Field meeting: Black Rock Circular: Brighton's basement!
Bristol Naturalists' Society
www.bristolnats.org.uk/geology
British Micromount Society
http://britishmicromountsociety.homestead.com
Bucks Geology Group
www.bucksgeology.org.uk
April 13 Rock and Fossil Day.
Cambridgeshire Geological Society
www.cambsgeology.org
Carn Brea Mining Society
www.carnreaminingsociety.org.uk
March 19 Thrilling Drilling – Pete Sheppard
April 16 AGM followed by Mining Postcards Part 2 – Kevin Baker
May 21 The Redmoor Mine Project – Brett Grist.
Cheltenham Mineral and Geological Society
http://cmgs.yolasite.com/society.php
Croydon Natural History and Scientific Society
www.greig51.freeserve.co.uk/cnhss/
Cumberland Geological Society
www.cumberland-geolsoc.org.uk
Cymdeithas Daeaeregwyr Grwp De Cymru: South Wales Geologists' Association (LG)
www.swga.org.uk
March 23 (Cardiff): AGM and Archaeopteryx: the story of an iconic fossil: Cindy Howells.
Cymdeithas Y Daeaereg Gogledd Cymru: North Wales Group Geologists' Association (LG)
www.ampyx.org.uk/cdgc/cdgc.html
Devon RIGS Group
www.devonrigs.org.uk
Devonshire Association (Geology Section)
www.devonassoc.org.uk
Dinosaur Society
www.dinosaursociety.com
Dorset Group (LG)
https://dorsetgeologistsassociation.org/
Dorset Natural History & Archaeological Society
enquiries@dorsetcountymuseum.org
Earth Science Teachers' Association
www.esta-uk.net
East Herts Geology Club
www.ehgc.org.uk
East Midlands Geological Society
www.emgs.org.uk
March 9 Incredible Ichthyosaurs – a decade studying Jurassic Sea Dragons – Dr Dean Lomax.
April 13 Derbyshire Blue John Revisited – Dr Tony Waltham & Dr Noel Worley.
Edinburgh Geological Society
www.edinburghgeolsoc.org
Essex Rock and Mineral Society (LG)
http://www.erms.org/
Farnham Geological Society (LG)
www.farnhamgeosoc.org.uk
March 15 Gemstones - Dr Kathy Chappell
April 5 Economic geology of the Weald Basin - Dr Richard Seaborne
April 13 Field meeting: Clatford Bottom.
May 18-25 Field meeting: Jura and Islay
May 24 Wind Farms as Renewable Energy - Dr David Shilston
May 29-June 1 Field meeting: South East Devon.
Friends of the Sedgwick Museum, Cambridge
www.sedgwickmuseum.org/activities/ friends.html
GeoLancashire (LG) www.geolancashire.org.uk
March 15 How Volcanoes Work - Harry Pinkerton
April 9 Field meeting: Brinscall Quarry / Horwich Stone works
May 2 Field meeting: Ecton Copper Mines
Geological Society of Glasgow
www.geologyglasgow.org.uk
Geological Society of Norfolk
www.norfolkgeology.co.uk
March 21 Unlocking the story of the Chalk of East Anglia. Mark Woods, British Geological Survey.
April 25 Out of the darkness: how stalagmites illuminate ancient climates. Presidential lecture by Dr Peter Rowe.
Harrow & Hillingdon Geological Society (LG)
www.hhgs.org.uk
March 13 Trilobites and their stony stare – Nick Fey.
April 10 Planet Mercury: An Update from the Problem Child of the Solar System – Jack Wright.
May 8 AGM followed by DVD about the History of Blue John.
June 12 The ups and downs of the South

Atlantic Ocean – Dr Lucia Perez-Diaz.
Hastings & District Geological Society
www.hastingsgeology.btck.co.uk
Hertfordshire Geological Society (LG)
www.hertsgeolsoc.ology.org.uk
March 14 AGM Chinese Geoparks – Nikki Edwards
April 11 Percy Evans Lecture and Presidential Address: Little things can make a big difference – the utility of calcareous nannoplankton – Dr Liam Gallagher.
May 9 Salt Tectonics on a passive margin – Sian Evans.
Horsham Geological Field Club
www.hgfc.org.uk
March 13 Green Men, French food and fossils: Brexit and the Bajocian - Bob Chandler.
April 10 TBC
May 8 AGM
June 12 The last British Ice Sheet – Dr Bethan Davies.
Huddersfield Geology Group
www.huddersfieldgeology.org.uk
Hull Geological Society
www.hullgeolsoc.org.uk
March 28 AGM
The Jurassic Coast
www.jurassiccoast.com
Kent Geologists' Group of the Geologists' Association (LG)
www.kgg.org.uk
Kingston Lapidary Gem & Fossil Society
Email: kingstonlapidarysocietyhull@gmail.com
The Kirkaldy Society - Alumni of Queen Mary (LG)
Leeds Geological Association
www.leedsga.org.uk
March 3 Victoria Cave and the forgotten climate controversy – Dr Phil Murphy.
May 9 The environmental consequences of volcanism – Evgenia Llyanskaya
May 22 The Green Lecture: Getting information from noise – Prof Roel Snieder.
Leicester Literary & Philosophical Society (Geology)
www.charnia.org.uk
March 9 Annual Saturday Seminar: Geology under the Sea
March 13 Precursor to UK Pennsylvanian Coals: Exploring Biogeochemical Processes in the Late Mississippian Rheic-Tethys Seaway - Dr Joe Emmings
March 27 AGM and Chairman's address: The Mesozoic Marine Reptile Renaissance: Part 3 Thalattosuchians, the Mesozoic marine 'Crocodiles' – Dr Mark Evans.
Liverpool Geological Society
www.liverpoolgeologicalsociety.org.uk
Manchester Geological Association
www.mangeolassoc.org.uk
Medway Fossil and Mineral Society
www.mfms.org.uk
Mid Wales Geology Club
www.midwalesgeology.org.uk
Midweek Geology Club
http://mwggyorkshire.org.uk/
Milton Keynes Geological Society
http://mkgeosoc.org/
Mineralogical Society
www.minersoc.org
Mole Valley Geological Society (LG)
www.mvgs.org.uk
March 14 Travels, trials & tribulations of an oil explorer – Dr Peter Dolan.
April 11 Cheddar Man & his DNA - Dr Tom Booth
April 13 Trip to Canary Wharf & Docklands: New buildings – old rocks Dr NM Eller & Andrew Loss
May 9 Mercury: The geology of the planet closest to the Sun -Professor David Rothery. The Open University
May 17 – 18 Field trip to Kimmeridge: Etches Museum & fossil collecting Geoviticultural Tour III: The Jurassic - leader: Dr M Eller
June 8 -9 MVGS 40th Birthday Geo-Extravaganza

Newbury Geological Study Group
www.ngsg.org.uk
Norfolk Mineral & Lapidary Society
norfolkminandlapsoc.homestead.com
Norfolk Geodiversity Forum
www.norfolkbiodiversity.org

North Eastern Geological Society
www.negs.org
North Staffordshire Group of the Geologists Association (LG)
www.esci.keele.ac.uk/nsgga
March 14 AGM & Chair's Address Dr Stuart Egan
Open University Geological Society
www.ougs.org
Oxford Clay Working Group
Email: saurian@live.co.uk
Oxfordshire Geology Trust
www.oxfordshiregeologytrust.org.uk
Peak Lapidary & Mineral Society
http://web.onetel.net.uk/~thedannatts/PLMS/Index.html
Phoenix Geological Club
Email: kwaston@hotmail.com
Pymouth Mineral & Mining Club
www.denul.net/pmmc/
Reading Geological Society (LG)
www.readinggeology.org.uk
March 4 Presidential Address
May 13 Microbialites role of bacteria and viruses in carbonate precipitation – Prof Maurice Tucker
June 3 Evening Geological Ramble in the Thames Valley
July 1 The bizarre Cretaceous limestone reservoirs that formed in lakes at the bottom of the South Atlantic - Dr Paul Wright
Royal Geological Society of Cornwall
Kowethas Riel Dororiethel Kernow - Royal Geological Society of Cornwall 1814
www.geologycornwall.com
The Russell Society
www.russellsoc.org

Shropshire Geological Society
www.shropshiregeology.org.uk
Sidcup Lapidary and Mineral Society
www.sidcuplapminsoc.org.uk
Southampton Mineral and Fossil Society
www.sotonminfoss.org.uk

Stamford and District Geological Society
www.stamfordgeolsoc.org.uk
Teme Valley Geological Society
www.geo-village.eu
Tertiary Research Group
www.trg.org
Ussher Society
www.ussher.org.uk
Warwickshire Geological Conservation Group
www.wgcg.co.uk
Welsh Stone Forum
www.museumwales.ac.uk/geology/welshstoneforum/about-the-welsh-stone-forum/
Westmorland Geological Society
www.westmorlandgeolsoc.co.uk
March 20 Gold Mine in the Clouds: the Ertsberg-Grasberg mine in West Papuav - Prof Kent Brooks
West of England Group of the GA (LG)
www.wega.org.uk
West Sussex Geological Society (LG)
www.wsgs.org.uk
March 15 The Core of the Earth – Prof Lidunka Vocadio
April 12 The Boxgrove Wider Area Project Mapping early Pleistocene deposits across the coastal plain of West Sussex - Dr Matt Pope.
May 17 Cope and Marsh - Dr Chris Duffin.
Jun 21 Supergiant Pterosaurs: a world tour - Professor David Martill,
The Woolhope, Hereford
www.woolhopeclub.org.uk
Yorkshire Geological Society
www.yorksgeolsoc.org.uk

SPECIAL EVENTS 2019

April 13
Rock and Fossil Day
www.bucksgeology.org.uk

May 4 - 5
Lyme Regis Festival
www.fossilfestival.co.uk

May 4 - 12
GeoWeek
www.bgs.ac.uk/geoweek/?src=topNav
Upload your own events on to interactive website

May 17
Geologists' Association
Student Symposium (GASS)
Members are encouraged to attend to hear about the latest research
https//geologistsassociation.org.uk

June 8 - 9
Mole Valley Geological Society
40th Birthday Geo-Extravaganza
www.mvgs.org.uk

October 13 - 19
Earth Science Week
www.geolsoc.org.uk/earthscienceweek
Upload your own events on to interactive website

October 18 - 20
GA Annual Conference
University of Manchester
conference@geologistsassociation.org.uk

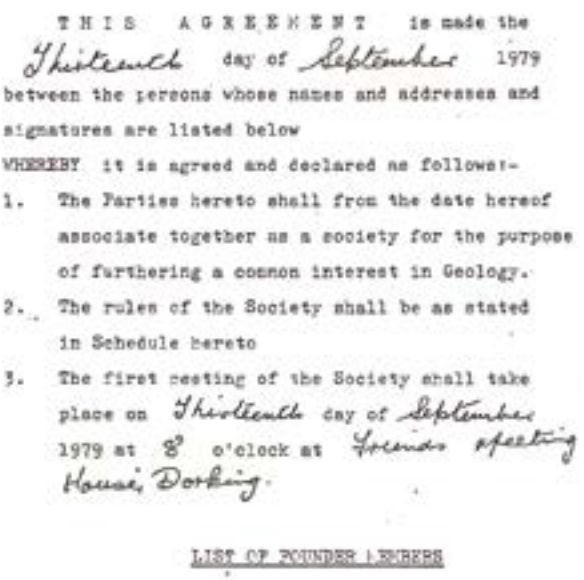
November 2
Festival of Geology
University College London
https//geologistsassociation.org.uk

Joe Collins at the Festival of Geology (see p.7)

News item: A Brief History of the Mole Valley Geological Society

By: Clare Hill, MVGS outreach Officer

Once upon a time London University ran extra-mural evening classes for people who wished to study for fun not to gain a paper qualification. As far back as 1968 a geology course was held in the Dorking Institute for Further Education by Mr Richard Butler BSc, FGS, a school chemistry teacher, who not only lectured but ran field trips too. His students so enjoyed his lectures and trips that they enrolled year after year after year until the 1977/8 session. In 1979 London University closed down its extra-mural activities. Saddened at this decision members of the geology class met at a private house in Dorking and decided to form a geological society. Twenty-six members of the former class re-convened at 8 o'clock on the 13th of September 1979 at the Dorking Friends Meeting House and signed a document which grandly declared 'The parties hereto shall associate together as a society for the purpose of furthering a common interest in geology'. The name 'Mole Valley Geological Society' (MVGS) was decided upon as appropriate because most of the 26 signatories lived in or around Dorking, though some came from as far afield as Horley, Horsley, Kingswood and Effingham. Rules were drafted and agreed. The former lecturer, Richard Butler, was elected President.



THIS AGREEMENT is made the Thirteenth day of September 1979 between the persons whose names and addresses and signatures are listed below

WHEREBY it is agreed and declared as follows:-

1. The Parties hereto shall from the date hereof associate together as a society for the purpose of furthering a common interest in Geology.
2. The rules of the Society shall be as stated in Schedule hereto
3. The first meeting of the Society shall take place on Thirteenth day of September 1979 at 8 o'clock at Friends meeting House, Dorking.

LIST OF FOUNDER MEMBERS

Figure 1: The 13th September 1979 Foundation Document of the Mole Valley Geological Society

From its inception the MVGS kept handwritten minutes accompanied by photographs of its various meetings and trips. These minute books and the Foundation Document are curated in Dorking Museum and Heritage Centre. The society flourished and membership increased from the 26 founding disciples to over 40 by the late 1980's with members now from as far away as Guildford, Alton, Faversham and Epsom. The MVGS was a Local Group of the Geologists' Association by 2006 and put on displays at the GA Annual Festival of Geology in University College London.

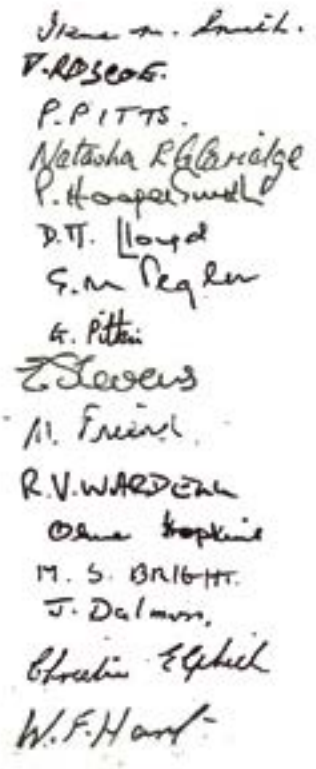


Figure 2: 16 original signatures (with 10 more signatories on a second page), making a total of 26.

Membership of the MVGS remained steady throughout the 1990's but then began to decline. This was in part because members moved away from Mole Valley. Some retained their membership for sentimental reasons, but no longer attended meetings. Members were reluctant to serve on the committee. Another reason for the decline in membership was that the society was not welcoming to new members and did little to advertise its presence to the local community. Visitors would attend meetings, sometimes join, but would soon drift away. The President and founding disciples had done little to make visitors welcome perhaps? By 2004/5 there were only 33 members of whom only about a dozen or so attended meetings. It was discourteous to invite famous geologists to travel from London or further afield to talk to such a small audience. Field trips had largely fallen into desuetude due to the age and infirmity of members.

In 2005 the committee decided that unless they could grow the membership, and more importantly increase attendance at meetings, then the MVGS would be wound up at the end of the year. Reports of meetings were now published in the local press. Notices of meetings were posted in Dorking Museum and Library. At meetings committee members wore badges with their names and position and hovered behind the Membership Secretary so that visitors, after paying the modest entry fee, would be welcomed, supplied with refreshment, and introduced to other members. The AGM was traditionally followed by a Presidential Address. However, Richard Butler, the stimulant and leader of the MVGS, died in 2006, so, in the absence of a President the Presidential Address was replaced by a jolly Annual Dinner, a feature that continues to this day, to the delight of the current President. The advent of the electronic age was another important aid to the

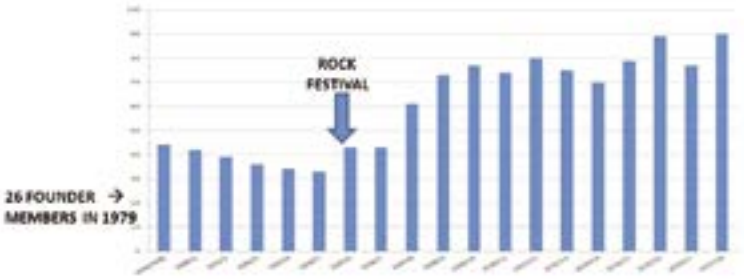


Figure 3: Graph of membership of the MVGS. From the 26 founders in 1979 membership increased and stabilised in the 40's but began a decline towards the end of the century. The impact of the 'Rock Festival' in 2006 along with other changes marks the renaissance.

renaissance of the MVGS, as for many societies, as correspondence with speakers and members could be emailed. Newsletters, normally photocopied and distributed by 'snailmail', were now produced and distributed electronically. A website was established. The steady decline in membership was now reversed.

The Chairman of the new committee was elected President in 2008. He continues to hold both posts concurrently. At the same time he was also Chairman of Dorking Museum & Heritage Centre which was undergoing a major refurbishment. This happy conjunction enabled the MVGS to be actively involved in the rebuild; to obtain a grant for the museum from the Curry Fund, to advise on the amazing Cubitt geological collection, to provide fossils for the children's petting area and guides to Dorking's famous South Street caves. This symbiotic relationship between Dorking Museum and the MVGS continues to the present day.

The renaissance of the MVGS has also been helped by the Heritage Open Days since they were established nationwide in 1994. Dorking holds more HOD events than almost any other town in the UK. The MVGS has put on events, mainly lectures, as part of this festival, adapting its contribution to the annual theme, even presenting a lecture on 'Mole Valley's Military History controlled by geology – naturally' when the theme was local military history. In 2006 the MVGS organised a Rock Festival, using the free publicity provided by the HOD. Lectures were given on 'The history of Dorking: the first 500 MY'. Members of the public were invited to bring along curious objects collected from seaside holidays to be identified by a panel of professors. The Rock Festival attracted an audience of >100 and lead to a dramatic increase in the membership of the society. Field trips were re-established, including a circumnavigation of the Isle of Wight in the paddle steamer 'Waverley' with a running commentary by a notorious local geologist.

With the appointment of a Vice-President for Field Trips & Fun in 2017 there is now a varied and extensive programme of excursions. Two years ago the society began an ambitious research project to study the geology

Figure 4: "Well it could be a bone from a Plasticosaurus sinaensis". "Yes if you look very carefully you can see it says here "Made in China." Professors Andy Gale and Dick Selley examine a specimen at the 2006 MVGS Rock Festival.

Figure 5: "Coccoliths? Where?" In 2008 members of the MVGS circumnavigated of the Isle of Wight in the paddle steamer 'Waverley' under the guidance of a notorious local geologist.

of English vineyards, sampling the rocks and the wine working down the stratigraphic column. This task may take many years to complete. Using the wide spread of its membership the MVGS produced a database of the personal and environmental impact of the 2018 Newdigate swarm of earthquakes. This data base was utilised by the Oil & Gas Authority as part of its investigation into the source of the tremors.

The MVGS now has 90 members and this year will enjoy 15 lectures, excursions, soirées and a 40th Anniversary Geo-Extravaganza. Thus the society continues to fulfil its founders' objective to 'associate together as a society for the purpose of furthering a common interest in Geology'. Talpas petra!

Acknowledgments: Thanks are due to primeval MVGS members Natasha Claridge, Fanny Lines and Tod Wilson who reviewed a draft of this article and made many helpful suggestions.

THE MOLE VALLEY GEOLOGICAL SOCIETY 40th ANNIVERSARY GEO- EXTRAVAGANZA IN THE MAIN HALL OF DORKING UNITED REFORMED CHURCH, RH4 1BS

www.mvgs.org.uk

Talpas petra!

SATURDAY 8th JUNE 2019

2.10 Opening of the Geo-Extravaganza by Nick Pierpont. President of the Geologists' Association

2.15 A brief history of the M.V.G.S.: The last 40 years. Professor R Selley. President & Chairman too

2.30 A brief history of Dorking: The last 400 million years. Dr M Eller. MVGS Vice-President: Field trips & fun.

3.15 Dorking's first BREXIT: The day the English Channel opened. Professor S Gupta. Imperial College

4.00 Tea & judging of the dinosaur cake competition with entries from Rose Wait & Mark Spence.

4.30 Dorking's dinosaurs & sea monster. Dr S Maidment. Natural History Museum. London.

5.15 Seismic Surrey: Surrey earthquakes ancient & modern. Dr S Hicks. Southampton University

6.00 The geology of Mole Valley vineyards ancient & modern. Professor R Selley. Imperial College

- moving seamlessly into a practical workshop studying Mole Valley rocks & wine...

8.00 Close

The hall will contain exhibits including the MVGS Foundation Document, minute books, illustrated field trip reports, and panels of the famous Cubitt Mineral Collection, courtesy of Dorking Museum.

SUNDAY 9th JUNE 2019

2.00 & 3.00 Tours of the geology of Dorking's famous South Street Caves led by Jim Harvey and walks to study Dorking's building stones, led by Mark Eller, and guided tours of the amazing Cubitt fossil & mineral collection in Dorking Museum, led by Richard Selley.

ADMISSION: Due to a generous donation from the Geologists' Association Wyley Fund there is no charge for admission to the meeting on the 8th. But to assist catering please will delegates register with Clare Hill, MVGS outreach officer (clare.hill@mybtinternet.com.) Places on the walks must be booked with Mark Eller (Mark.eller@phonecoop.coop.) Places on the cave tours must be booked at Dorking Museum www.dorkingmuseum.org.uk noting price and H & S conditions & restrictions.

Wyley Fund Interim Report: *Thyreophora*, the armoured dinosaurs

Recipient: Tom Raven Natural History Museum & the University of Brighton

Figure 1: The juvenile ankylosaur *Liaoningosaurus* from the IVPP in Beijing

Thyreophora, the armoured dinosaurs, are a group of bird-hipped ornithischian dinosaurs. They are characterised by their elaborate use of osteoderms, or body armour, on the head and body, and comprise the lineages *Ankylosauria* and *Stegosauria*, of which the most famous and recognisable members are *Ankylosaurus* and *Stegosaurus*, respectively. They are a diverse group, with up to 100 species known, and survived from the earliest Jurassic to the latest Cretaceous and lived on every continent. However, despite their familiarity with the general public, and an excellent fossil record, they are relatively understudied, especially in terms of their phylogenetic and evolutionary patterns, with most studies focusing on the form and function of their bizarre ornamentation. This has meant that there has been no previous attempt to build a species-level phylogenetic tree of the thyreophoran dinosaurs, hindering attempts to study their macroevolutionary patterns.

Support from the Geologist's Association Wyley Fund allowed me to visit China and Mongolia in June and July 2018 to visit the Institute of Vertebrate Paleoanthropology and Paleontology (IVPP) in Beijing and the Mongolian Academy of Sciences in Ulaanbaatar to study world-class examples of thyreophoran dinosaurs. China has the highest diversity of stegosaurs from anywhere in the world, with over six species having been found, and Mongolia has some exceptionally well preserved ankylosaurs such as *Saichania* and *Pinacosaurus*, which includes a rare growth series of ankylosaurs. This trip allowed me to make first-hand observations of 17 taxa for inclusion into a phylogenetic super-matrix of the thyreophoran dinosaurs as well as systematic observations on enigmatic taxa such as *Bienosaurus*.

This new, comprehensive phylogeny is still being constructed, with a visit to the United States and Canada to come in May 2019, but it will be completed by the end of the second year of my PhD in September 2019 after having seen over 60 taxa first-hand. It will then be used as a backbone for studies of macroevolutionary processes within the Thyreophora, such as on the diversity and disparity (morphospace occupation) across time, as well as character, speciation and extinction rate analyses, providing new insights into the mode and tempo of evolution of these enigmatic Mesozoic dinosaurs.

Figure 2: an exceptionally-preserved skull of *Saichania* in the Central Museum of Mongolian Dinosaurs, an institution highlighting specimens retrieved having been illegally poached from Mongolia

INDUS experiences
JOURNEYS OF DISCOVERY

Geology, Ecology & Geography Field Trips 2019

Spiti & Lahaul India

Led by Heather Kelly & John Macgillivray

27th July to 14th August 2019 (18 days)

Per person sharing a room £3970.00 with flights. Single Room supplement £730.00

For People with a sense of adventure, who would like to explore this little-known part of the high Himalayas close to the border with Tibet. We will see some dramatic geology, look at some of the plants and animals which make their home in this mountain desert and visit ancient Buddhist monasteries. The area is remote, the roads are rough and the driving slow. Accommodation will generally be in basic hotels, home stays and a tented camp though the hotels in Delhi and Shimla, at the beginning and end of our trip, will offer a touch of luxury.

Kashmir & Ladakh India

Led by Dr Danny Clark-Lowes

3rd to 18th August 2019 (16 days)

Per person sharing a room £3350.00 with flights. Single Room supplement £640.00

Experience the rich culture of Kashmir & Ladakh, contrasting the beauty and charm of the Kashmir valley with the splendour of the Ladakh mountains. Transport will be in comfortable vehicles, on tar and dirt roads through wild valleys and over high passes (going up to 5,000 metres above sea level). Trek in remote valleys, up to a glacier snout and to the suture between the Indian and Asian plates, visit Buddhist monasteries and temples perched on remote hillsides. Accommodation in Srinagar will be in period houseboats on Nagin Lake, good hotels, local lodges elsewhere and at a well-appointed camp at Tso Moriri.

A Geology Field Trip to Oman

Led by Professor Mike Searle & Professor Bruce Levell

01st to 13th December 2019 (13 days)

Per person sharing a room £4995.00 with flights. Single Room supplement £1420.00

This is a rare opportunity to explore the landscapes and geology of Oman, with dozens of World class geological sites, including the World's largest and best exposed ophiolite, eclogites, sheath folds, fantastic exposures of Mesozoic limestones and ancient Tethyan Oceanic seamounts, as well as amazing deserts and beautiful coastline. It is suited to amateur geologists who want to learn about Oman and to apply their existing knowledge in the field.

International Geological Congress, Delhi, March 2020

The 36th IGC will be taking place in Delhi, 2 to 8 March.

Indus Experiences will be running a field trip post IGC Congress led by Dr Danny Clark-Lowes. It is planned that this field trip, most probably to Rajasthan, will take place after the congress for 12 days.

If you are attending the Congress and wish to join this trip or take a pre or post congress holiday in India Please contact us with your enquiry or register your interest by sending an e-mail to: **holidays@indusexperiences.co.uk**

Full details of itineraries, costs and how to book these tours please visit
www.indusexperiences.co.uk/earthsciences E: holidays@indusexperiences.co.uk T: 020 8901 7320

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Exhibition Report: Core Sample Temporary Exposure

10th - 18th November, 2018

Artist: Gail Dickerson

By: Diana Clements

Gail's Core Sample project began with a core of London Clay that she had acquired from Glasshill Street, SE1. She used part of it as a pigment for her artworks by grinding up the clay and applying it using different techniques. The sample inspired her to find out more about the local geology and the idea for an eventual exhibition was sown. During 2017 Gail Dickerson wrote to the Geologists' Association looking for someone to write geological poems and help with the geology around Elephant and Castle.

Figure 1. Geoconservation Day in Riddlesdown Quarry, Croydon in September 2017. Dr Liam Gallagher explains the geology

We are fortunate that the GA has a geological poet, Barbara Cumbers, on Council and so we were able to introduce her to Gail who had joined the GA and become a regular attendee at our talks. We could also help her with the geology of Elephant & Castle by introducing her to members of the London Geodiversity Partnership (LGP), including myself, who specialise in identifying and interpreting London geology. As it happened, Elephant & Castle was on the list of sites to be investigated. The Rockingham Anomaly at the 'Elephant' had been brought to our attention by the London Borough of Southwark as a possible site of some geological importance. We had independently noted the curious patch of peat very close to the shopping centre while trying to research the anomalous 'River' Neckinger.

Gail threw herself into her geological research by coming out on excursions both with the GA and the LGP and helping with the LGP Geoconservation Days. She was able to collect samples to expand her palette of pigments for her artworks. She collected chalk from the big quarry at Riddlesdown and Thanet Sands and Lambeth Group sands and clays from the Woolwich, Reading and Upnor beds from Gilbert's Pit, Charlton, providing a variety of colours which are present at depth beneath the streets of her chosen area. Both these sites provide some of the best exposures of the geology within the Greater London Area. Dr. Liam Gallagher (our GA Magazine editor) led the Geoconservation Day to Riddlesdown and explained the geology to the group.

Gail's studio is in Elephant & Castle and was adjacent to a large building site; Elephant Park, which gave her an opportunity to photograph the demolition of previous buildings and observe what lay beneath. She gathered together the various layers from around the area to include the uppermost horizons of Kempton Park Gravel, Alluvium and Made Ground of concrete rubble and bricks. All of these materials are included in her artworks to great effect.

It was the peat in the Rockingham Anomaly that drew the interest of the London Geodiversity Partnership and Gail was very keen to collect a sample to include in her artworks.

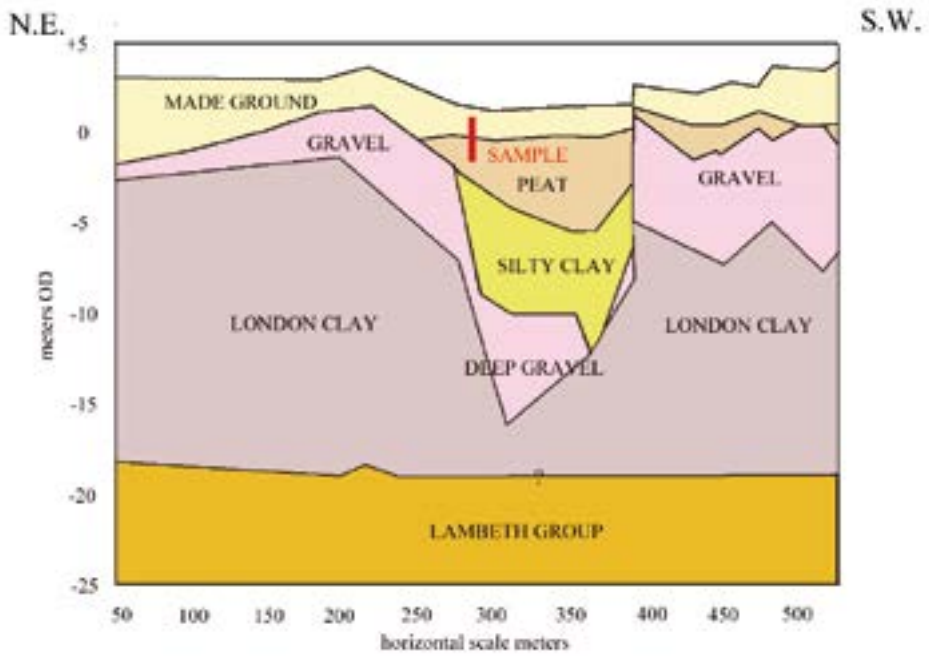


Figure 2: Cross-section of the Rockingham Anomaly, executed by Mike Hacker from the original drawing by Paul Rainey and printed for the Core Sample Exhibition by GiGL (Greenspace Information for Greater London)

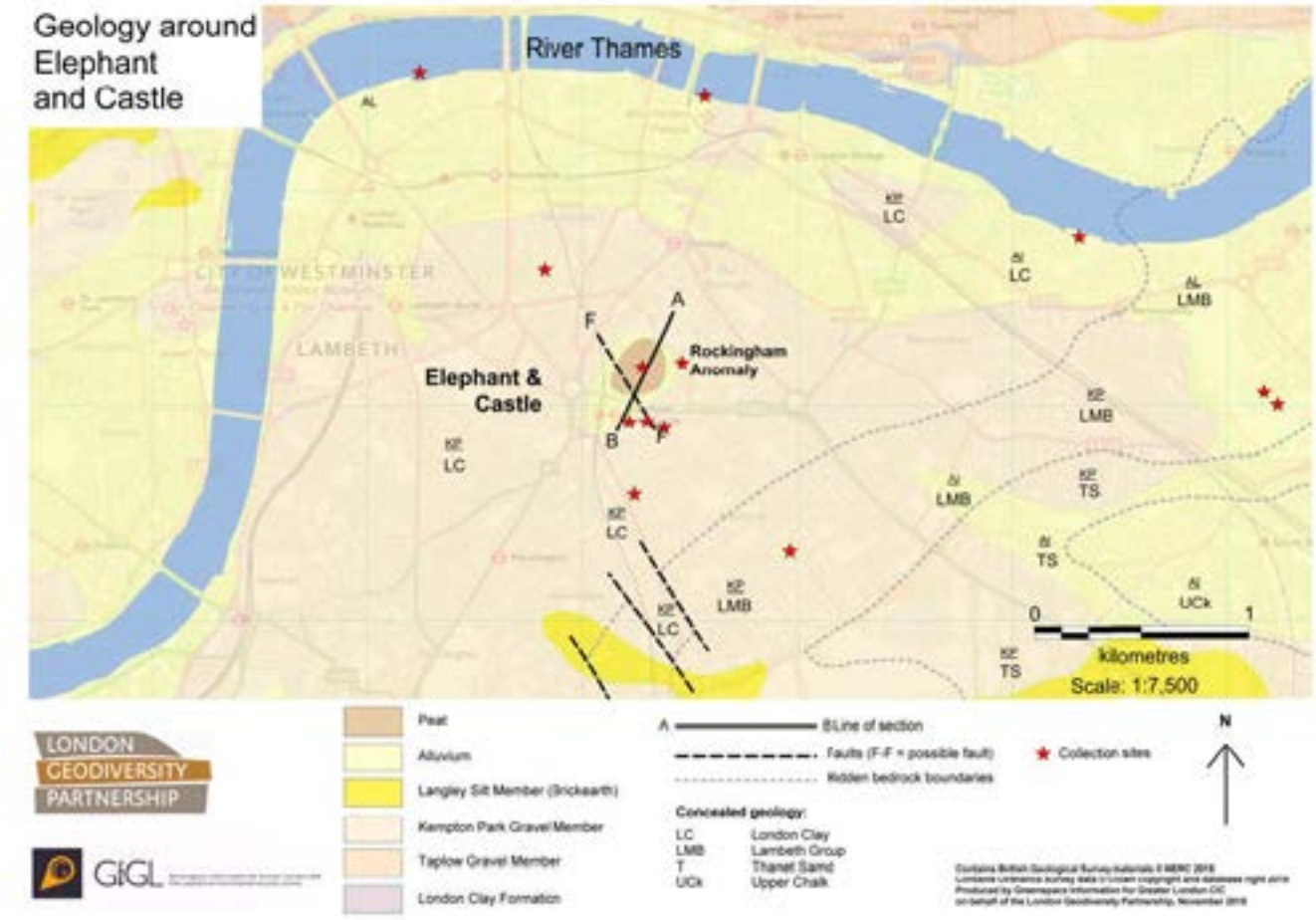


Figure 3: Geology of the Elephant & Castle showing the Rockingham Anomaly and line of section. Samples were collected by Gail at the starred sites.

She persuaded us to auger for it in the grounds of a housing estate constructed entirely within the sunken area defined by the compacting peat. We went out to reconnoitre, helped by the notes provided by one of our number, Paul Rainey, including a cross-section drawn from publicly obtainable borehole data.

One of our members owns a small hand auger; Gail chose a suitable spot and eventually succeeded in acquiring the relevant permissions for us to attempt to reach the peat. Alarmingly we kept hitting masonry and a look at the old maps provided by Paul showed that there used to be a row of houses on this spot. Undaunted we kept augering. The position chosen lay above the main sewage drain in the area and there was a moment of anxiety that we were drilling through that but before we could calculate the depth of the sewer we hit peat at nearly two metres depth. It was a euphoric moment and we were all much relieved. LGP took a small sample and Gail took enough for her artworks.

Over lunch Gail outlined the idea of holding an exhibition on the project at the local Newington Gallery and told us she would like to include a display about the local geology. She planned a book to accompany the exhibition featuring her artworks and including photographs of the local excavations and the poems written by Barbara Cumbers and a local historian, Anna Robinson.

Figure 4: Gail auguering for Peat under the Rockingham Estate in November 2017

The exhibition took place between the 10th and 18th of November 2018. Gail invited LGP to talk about the geology at the launch and the exhibition finished with a poetry reading from Barbara and Anna. It was a really interesting exhibition in a lovely space that worked well for Gail's large canvases. The poems were interspersed with the artworks.

She had a couple of floor exhibits, one on the ingredients of concrete, another with cut around 'paintings' with the rock (earth) pigments mixed with comments from an earlier street project on the locality. Visitors were invited to add their own reflections. LGP were allocated a space where we displayed posters of the local geology and the cross-section of the Rockingham Anomaly. We used the samples collected by Gail for handling samples and a mock-up core of a borehole at Elephant & Castle that Gail had found, appropriately scaled to fit into an Ikea glass jar only 68 cm tall. The latter was a real challenge and ended up a bit wonky but it got the point across. The backdrop to the LGP exhibit was three small artworks using peat from the Rockingham Anomaly.

Figure 5: Pictures from the Exhibition: Gail's artworks, including the much-admired *Rivers Diversion* (centre) and floor work *Thought Fragments: London earth pigments and people's thoughts on paper*

We do congratulate Gail on her project and the success of the exhibition and hope that her interest in geology will continue and she will be able to use it in other projects. In the meantime her artworks can be viewed on her website where you can also purchase the accompanying book with the poems.

Website: https://gaildickerson.com/ for images of Gail's work and photographs from the Exhibition.

Book: *Core Sample: Layers of London and the Elephant & Castle.*

A project by Gail Dickerson, Barbara Cumbers and Anna Robinson, 2018. £10. Details on the website. Available either through the website or from Barbara Cumbers who can bring copies to Burlington House. Contact her via awards@geologistsassociation.org.uk.

Colours of London

Sediment carried by fluid
rolls downslope around pebbles
over small imperfections, settles

and dries in washes
of layers under London —
clay, silt and sand,

white streaks of chalk,
its coccoliths and foraminifera.
Here and there, dendritic
run-off has bubbled,
transparent. Earth colours
contour the dark of hills

that streets flow round —
lines of pinprick light
to fill the valleys.

By: Barbara Cumbers

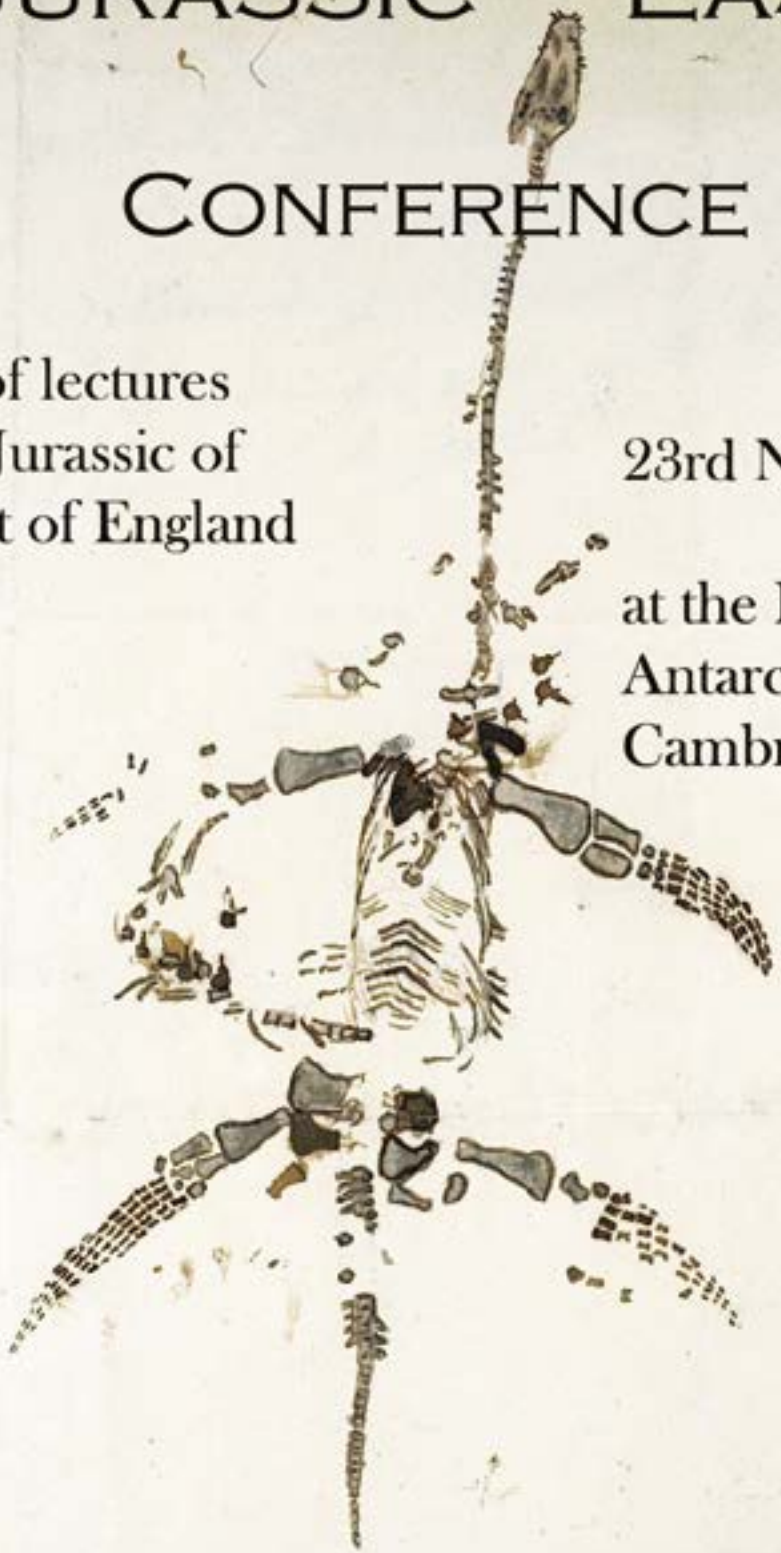
JURASSIC EAST

CONFERENCE

A day of lectures
on the Jurassic of
the East of England

23rd Nov 2019

at the British
Antarctic Survey,
Cambridge



With support from

GEOLOGISTS' ASSOCIATION 1858

GEO EAST
THE EAST OF ENGLAND GEODIVERSITY PARTNERSHIP

For more information, see
http://www.geo-eastevents.org.uk/

Image courtesy Wikimedia Commons

I have devoured [illegible] a rough sketch [illegible]
some idea of what it is like. [illegible]

News item: Kendal Museum Geological Collections

By: Richard Wrigley

The Lake District is a favourite geological destination renowned for classic geology, and stunning scenery however, in addition to the famous outcrops it is also home to two of the most important mineral collections in Northern England. Kendal Museum, located in the centre of Kendal, houses the John Hamer and the Bill Shaw mineral collections as well as fine displays of Lakeland geology with emphasis on Palaeozoic fossils, particularly from the Silurian rocks of Benson's Knott and the Carboniferous Limestone of Kendal.

Founded in 1837, Kendal Museum can trace its collections back to one of the Lake District's earliest museums set up as a private venture by William Todhunter in Kendal in 1796. Following his death in 1832, the contents of the museum were sold and formed the basis of the museum set up by the Kendal Natural History and Scientific Society. The Society (later known as the Kendal Literary and Scientific Society) was founded by Cornelius Nicholson and Dr. Thomas Gough, son of John Gough, the blind philosopher. Early supporters included Adam Sedgwick, John Dalton and William Wordsworth. The geological collection was mainly assembled by the first honorary curator, Dr. Thomas Gough, together with Adam Sedgwick and John Ruthven. The collection was reputed to be 'one of the finest and most comprehensive in the country'.

The museum continued to grow until the early 1900's, however, there was a decline in interest and in 1913 ownership was transferred to the Borough of Kendal. By the end of World War 2 (WW2) the museum was in a poor state. In 1958, following the recommendations of the Joint Committee of the Museums Association and the Carnegie United Kingdom Trust, it was decided to dispose of geological specimens. A large part of the collection, including most of the specimens, was sold in 1960 to Liverpool, Hull, and Wigan Museums.

In 1974 the Museum passed into the ownership of South Lakeland District Council. Three years later the Council placed management of the Museum into the hands of a private trust, the Lake District Art Gallery Trust.

In 1979 work began on the Lake District Natural History Gallery, which was to include a geological display, and in 1981 the new gallery was opened to the public. The museum's geological collections were enhanced by the acquisition of the Hamer and Shaw mineral collections. Today Kendal Museum is a visitor attraction and a teaching museum, managed by Kendal College.

Figure 1: John Lewis Hamer

John Lewis Hamer was born in 1916 in Ingleton where he lived as a recluse. He served in WW2, never married and when he died in 2002 solicitors dealing with his affairs found every room in his house full of floor to ceiling shelves containing an estimated 2000 mineral specimens. The house was so full of mineral specimens Hamer slept in the hall. His collection was destined for landfill, however, the solicitors had the foresight to contact Kendal Museum and the collection was saved.

Hamer was a keen potholer and compulsive mineral collector whose collection was one of the most superb and extensive mineral collections known in the North of England. He meticulously catalogued his collection and had written diaries and books on potholes and caves.

The Hamer collection includes specimens from long disused mines in the Lake District, where mineral collecting is now banned, and other regions of northern England. He rescued superb irreplaceable specimens from these sites, collecting them before deterioration from exposure to the elements occurred. His collection also contains international specimens

Figure 2: A selection of the Hamer collection

and includes beautiful ruby crystals from Myanmar and spectacular tourmaline crystals embedded in quartz from Brazil.

The entire Hamer collection has been catalogued and specimens together with a complete catalogue, original note books, display charts and a map locating mine sites are on display in Kendal Museum.

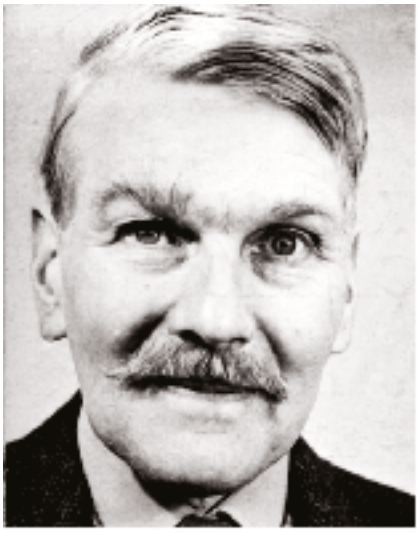


Figure 3: Bill Shaw

In contrast to Hamer, Bill Shaw was a mining entrepreneur descended from five generations of miners. He grew up in Coniston starting his first job in his father's quarry. In 1925 he studied for four years at the Glasgow Mining office then returned to the Lake District working in Greenside mine as an apprentice, eventually leaving as a qualified mining engineer. He worked in several mines in the Lake District, including Hartsop Hall, Greenside, Force Crag, Coniston, Potts Gill and Sandbeds to name a few. During his long career in mining he collected many fine and rare mineral specimens. He retired to Keswick and died in 1978.

The Shaw collection comprises 190 mineral specimens and includes important copper minerals from Coniston copper mine, rare minerals from Fleetwith mine including brilliant blue Azurite and Hornblende. The Shaw mineral collection has been digitised and the images and descriptions can be viewed Kendal museum website.

Figure 4: Part of the Bill Shaw collection on display

Specimens from both the Shaw and the Hamer collections are on view in clearly annotated display cases. The collections are available for research with a searchable online digital database for both the Hamer and Shaw collections with specimens catalogued, photographed and described making these previously unseen collections accessible to everyone.

The museum has geological archives that contain several items of historic interest:

Catalogues, two volumes, R. Bullen Newton 1884,1885;

Official Handbook and Catalogue of the Kendal and Borough Museum 1924;

Stock Book of the Lower Gallery of Kendal Borough Museum 1939–1940;

Inventory of the Geological Collection 1991;

Correspondence relating to the disposal of the geological collection, photographs, press cuttings and other papers referring to the Museum and Kendal Literary and Scientific Society.

There is also a small library containing rare nineteenth-century geology books.

Figure 5: Campylite, Dry Gill Mine Caldbeck Falls. Bill Shaw Collection

GEOLOGISTS' ASSOCIATION ANNUAL DINNER

Friday 3rd May 2019

GA annual dinner will be held in the Lower Library of the Geological Society. It is an informal and friendly occasion and is held after the AGM and the Presidential Address.
£35 per person, sherry reception, two course hot buffet.
Book now either by phone, or email

The Annual Report 2018 with colour photographs will be available in April when it will be emailed to Members. If you would prefer a paper copy in black & white please contact Sarah; email: admin@geologistsassociation.org.uk
or phone 020 7434 9298
Please make sure Sarah knows of any change of email address and please complete your Confirmation of Details form if not already done so (available on the website under About/About the GA)

THE GEOLOGISTS' ASSOCIATION ANNUAL GENERAL MEETING
AGENDA 3 MAY 2019 at 6.00 pm

1. **Minutes of the 2018 AGM.**
2. **Introduce and approve Annual Report for 2018**
3. **Proposed Officers for 2019/20**
4. **Proposed Council Members for 2019/20**
5. **Expression of thanks of the Association to retiring Council Members.**
6. **Presentation of Foulerton Award**
7. **Presentation of Halstead Medal**
8. **Presentation of the Halstead Award**
9. **Presentation of Richardson Award**
10. **Presentation of the President's Award**
11. **Presentation of Curry MSc and Tupper Awards**
12. **Research Awards**
13. **Long serving members**

Presidential Address for 2019
Mr Nick Pierpoint: *Hydrocarbon Exploration is a Risky Business*

Rockwatch News

By Susan Brown

For those who are new to the Geologists' Association (GA) and to new readers of this magazine, Rockwatch is the junior club of the Geologists' Association. Membership age ranges from 7 years (younger in very special cases!) to 18. We also offer family and institutional membership. We run field trips for members only, from March to October, organise special events for members, for example behind the scenes tours of museums, free entry to many geological events throughout the country and entry to lecture series run by the GA and its many local groups and affiliated societies. We also hold a range of activities for the general public in museums, at festivals of Geology, and in schools, for example, to help fulfill our charitable status obligations.

Figure 1: Susan Brown (second from left) cuts the ribbon at the opening of the Lion Salt Works Museum

We have a number of trips already planned for the coming year, some old favourites, some first time visits. The following give a flavour of some of the trips we have planned: a 'behind the scenes' visit to the Lapworth Museum in Birmingham and a weekend in Derbyshire focussing on the depositional environment and mineral heritage of the Ashover area followed by an exploration of the National Stone Centre and its industrial and geological heritage on day two, both of which are firsts for Rockwatch. Another site, also a first for Rockwatch, will be an exploration of the Lickey Hills using a Deep Time Voyager app in the morning and a geological walk in around the area in the afternoon. Our annual South Wales weekend this year will be an exploration around the Vale of Glamorgan taking in coastal and inland sites. We are organising a visit to the Lion Salt Works Museum in Cheshire, which this year is celebrating, along with many other organisations, the UNESCO 'International Year of the Periodic Table'. This was launched in Paris on 29 January. In June 2016, this museum was awarded a Curry Fund grant towards new display panels and updating pages on its website. The display panels are located on the fence surrounding one of the few remaining salt pans which is located just outside the Museum's main entrance. Our seventeenth annual residential course on the Jurassic World Heritage Coast of Dorset and East Devon this year will be the last week in July. It is rather amazing to think that we have been running this annual residential course for so many years and it is as popular as ever, with some families returning year after year and always being joined by those on their first, usually of many, visit.

Figure 2: Behind the scenes at the Natural History Museum

Some of the public events, which we will be either running ourselves or in partnership this year, include the annual joint National Science Week with colleagues at the British Geological Survey (BGS) at its HQ in Keyworth. This takes place over three days when local primary schools from the East Midlands area each spend half a day at BGS sampling a whole range of geological activities and clearly seem to have a very exciting and enjoyable time. Normally there is a Family Day open to the public on the Saturday of that week, but not this year. Instead, BGS will hold a public Open Day in the summer to which Rockwatch

has been invited, so we will be running a range of activities during the day. We will also be joining Ware Museum again sometime during August to run a public Family Day with colleagues there. This is one of our favourite small museums and we always look forward to our visits there. The families who visit during the day are very enthusiastic and often there are three generations in a family group all working together on a masterpiece, something that they rarely have time to do during busy term-times.

So, these are but a few of the events we have lined up for our members and for the general public. If any of the public events are happening near you, do pop in and join us, we'd love to see you. And, if there are any member only field trips that you think your own children or grandchildren would like, then maybe take out a membership for them so they can then enjoy the benefit of all our trips.

For more details our website is: www.rockwatch.org.uk and our e-mail address is: hello@rockwatch.org.uk

Figure Rockwatchers at Coal tip above Blaenafon

THE JOHN CATT SYMPOSIUM

Hertfordshire Geological Society

HNHS

East Herts Geology Club
www.ehgc.org.uk

BEDFORDSHIRE GEOLOGY GROUP

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Further details and booking information will be on the HGS web site hertsgeolsoc.ology.org.uk shortly.
Or contact: hgstreasurer@btinternet.com

The Geologists' Association

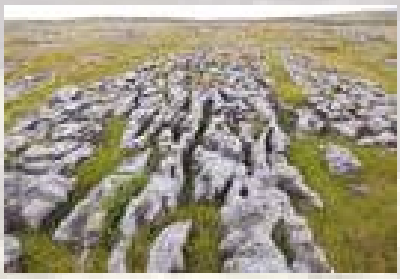
Annual Conference 2019

Geological Resources in the North West - Past, Present & Future

at

University of Manchester and Manchester Museum

18th - 20th October, 2019



Provisional Outline Programme

Friday 18th October

Arrival & Registration. Plus a visit to Manchester Museum's Minerals & Palaeontology section

Saturday 19th October

Talks and Posters at Manchester University campus followed by evening Conference Dinner

Sunday 19th October

Field Trips to significant North West Geology sites

For further information and registration:

Visit: www.geologistsassociation.org.uk

or email: conference@geologistsassociation.org.uk

Registration opens 1st April, 2019

Hosted by the geological groups of Lancashire, Liverpool, Manchester, North Staffordshire & North Wales

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