Volume 13 No. 4 December, 2014

In the Shadow of Mt Vesuvius | Puddingstone & Silcrete | Isle of Wight Mapping

Festival of Geology | Stone Pipe Company | Isle of Man

A Mistley Mystery

GEOLOGISTS’ ASSOCIATION

1858
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curryfund@geologistsassociation.org.uk

Research Awards
Deadlines
15 November 2015
awards@geologistsassociation.org.uk

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LAST Copy dates for the Circular & Magazine:
March Issue: January 13
June Issue: April 21
September Issue: July 21
December Issue: October 20
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

Cover picture
Scarlett Point, Isle of Man; dolerite dyke - see article on page 11. (photo Lesley Exton)
It’s been a hectic couple of months since the GA conference in Leicester and I’ll try to cover at least some of the highlights so that you can see what the Association has been involved in. The annual conference “Palaeo’ to the People” was a really excellent meeting although it would have benefitted from a few more attendees. Having said that, all those who have provided me with feedback have been very positive, praising the range and quality of the speakers and the smooth local organisation. We have Mark Williams to thank for the latter as he proved an able local organiser. I’m not sure if it was Mark, but someone also laid on some excellent weather for the two field trips which ran on the Sunday. I heard that most people on these spent a good part of the time looking for shade as well as Charnia.

Ducking out of the field trips on the Sunday I attended the opening day of the British Association Science Festival on the University of Birmingham campus. The staff of the Lapworth Museum were doing excellent trade exhibiting dinosaur bones; their Academic Keeper Dr. Richard Butler also took on the role of the GA Halstead lecturer with a talk on early dinosaur evolution to a packed audience. He represented the Association well with an excellent talk and fended off questions from an audience of all ages.

I managed to fit in a long planned visit to the Black Country Group in September, presenting them with an introduction to some of the more unusual uses for microfossils. This extremely active group entertained us well in the newly completed Dudley Archive building which is very impressive with even its own coffee mugs to go with the welcome range of biscuits.

October saw the launch of the Geodiversity Charter for England at a special meeting held at the House of Commons and opened by the Parliamentary Undersecretary for the Natural Environment and Science Lord de Mauley. Thanks and compliments go to Lesley Dunlop who has chaired the English Geodiversity Forum during the production of this important document. She also organised a fascinating line up of speakers for the launch, ranging from GA Senior Vice President Rory Mortimore on why Geodiversity is so important, through the Jurassic coast (Sam Rose), the Dudley Bug (Graham Worton) to a lovely lady from Hampshire (Christine Taylor) who brought along an amazing tapestry representing the geology of the county.

As with any such launch, it’s important to see what follows and how the charter can be used to forward the importance of all aspects of Geodiversity. It certainly raised the profile of the subject, with several MP’s in attendance and a final summary being provided by Andrew Sells, Chair of Natural England.

There is no Council meeting immediately before the Festival of Geology as we organise the annual Local Societies meeting at Burlington House. This year we had a packed council chamber with Local Group and Affiliated Society representatives from across the country who all joined in with some lively discussions. It’s always a great opportunity to exchange ideas, to review what’s worked and what hasn’t both on a local and a national scale.

Meetings supported and sponsored by the GA this year have included the Old Red Sandstone meeting in Brecon, which had sessions for academic lectures as well as for the general public. By the time this message goes to press we will have seen the Geology and History in Southeast England meeting in Worthing, and we hope this is a major success after all the hard work the West Sussex group have put in.

The following day was the Festival of Geology at UCL and I am still amazed at the incredible transformation that took place in the North and South Cloisters between 9am, when I turned up with my car load of display material for the Hertfordshire Geology Society, and 10.30am when the first members of the public started to arrive. The displays were all very impressive and even if I didn’t get around to speaking to you all, can I compliment all those who constructed the presentations because they were all very impressive.

Rockwatch was this year in a marquee on the front quad so we perhaps didn’t see quite as many young faces passing through the cloisters as we sometimes do. Nevertheless they were out in force picking microfossils or racing trilobites on the quad during the sunny spells. I managed to sneak into the back of the Gustav Tuck lecture theatre for part, if not all, of three of this year’s lectures. These again played to packed houses with topical subjects including fracking, the Jurassic Coast, planet oil and forensic geology. Our thanks go to all our speakers, Peter Doyle, Iain Stewart, Richard Edmonds and Laurence Donnelly for entertaining and enlightening us, despite Laurence’s attempt to spoil our Saturday dinners with his review of geology and human burials.

On the Sunday a range of building stone and lost river walks took place around London in spite of threatening weather. I took the safe option by standing in for the indisposed Rory Mortimore and helping to lead the trip into Chiselhurst caves which were guaranteed to be dry. We had about forty participants on this who enjoyed their subterranean wanderings before going on to visit the Crystal Palace dinosaurs in the afternoon.

Next year is already promising to have an active programme with next year’s conference in October giving us the opportunity to have a look at building stones across the country. Between now and then have an enjoyable festive season and I look forward to meeting you in the New Year.
During the early autumn the GA has had a busy time with meetings around the country. As well as the Leicester Conference we were represented at the Festival to celebrate 150 years of the Ilford Mammoth, the Old Red Sandstone conference in Brecon, the QRA conference on the Lower Thames and the Sidmouth Festival. We were also invited to talk to the public about the geology of Burlington House for Open House Day. We like to take a GA stand to events when we can and would welcome volunteers to run one for events away from the capital. For Brecon and Sidmouth we dispatched the GA banner and relevant material to the organisers and are happy to do the same for other events. The GA Festival is our big event at this time of year and our thanks go to everyone who has helped make it such a success. This year we added geology poetry readings as well as a number of new activities for children of all ages in the ‘Discovery Room’ which this year was in a sophisticated ‘tent’ in the quad. Details are on p. 5.

The day before the Festival we held the usual meeting for our Local Groups and Affiliated Societies and a number of interesting ideas were put forward for outreach to the wider community. It is always useful for Council to meet the groups and learn what they are doing. It was announced that the Geological Conservation Review issues of PGA will be available to purchase individually. These are important citations of our national geological sites and we are pleased to make them available to a wider public.

Sara Osman has taken over from Paul Winrow as GA Librarian. She is busy cataloguing the map collections. The catalogue will be put on the GA website for members in due course. Richard Pollock from the Bath Geological Society has been co-opted on to Council to help with marketing.

During the summer I responded to the online Smarter Guidance Consultation on behalf of Council. This is a government initiative to streamline information and was sorely lacking on geodiversity. The GA also wrote in support of the new English Geodiversity Forum. We wrote to Torquay Museum as requested in response to threats from Local Authority cuts and are pleased to announce that the museum will not be allowed to die possibly because the English Riviera Global Geopark has managed to bid successfully to host the UNESCO 2016 conference on Global Geoparks.

It is the time of year when Council asks for nominations for the Halstead Medal and this year we are also asking for nominations for the Henry Stopes Memorial Medal (awarded every 3 years). These will be awarded at our AGM in May. Please also send in your nominations for new Council Members. Deadline for all the nominations is 31st January. See details on p. 6.

With the December edition of the GA Magazine you will find the Green Card listing our events for 2015. Please note that Council has decided to put the timing of our regular Friday lectures back by half an hour. For 2015 they will all begin at 6.30 with tea at 6.0. Four of the dates will be on the 2nd Friday of the month: January, February, April and December. Our newly-recruited Overseas Field Officer, Ian Sutton has been busy fixing up trips to Portugal with David Bridgland and the Greek Islands with Paul Olver. Look out for the details and book early to avoid disappointment. Details of our day trips in 2015 are also included in this issue of the GA Magazine.

With the Festive Season approaching, this year we will create a calendar from entries to the Photographic Competition to help you with your Christmas shopping. This will be available to purchase at our GA talk on 5 December or through the GA website, so look out for it. Alternatively, why not give a GA Membership to someone this Christmas? Application forms are on the website. With best wishes for 2015 and we look forward to seeing you at our events.
2015 was probably the largest Festival ever. It attracted large crowds with familiar and new faces along with a large number of families.

The four talks by Peter Styles, Richard Edmonds, Iain Stewart and Laurance Donnelly were all full. Ruth Siddall’s building stone walk around the campus was also very popular. This year we introduced a new venture: Geology and Poetry with readings by John Wedgwood Clarke, Barbara Cumbers, Alyson Hallett and Michael McKimm, part of the “On The Endless Here” www.ontheendlesshere.com.

The entries for the photographic competition were of a high standard. The three winners are Gerald Lucy, Gillian Sheail and Heidi Barnes (their winning pictures are reproduced on the inside back page). We were so impressed by the quality of the entries this year that we decided to produce a GA calendar. This will be available to purchase at our GA talk on 5th December or through the GA website.

This year the ‘Discovery Room’ was a sophisticated ‘tent’ constructed in the Quad. It was a bigger space than usual so we added extra activities for our younger audience. As well as Rockwatch, UCL Museums & Collections, BGS, and the Kent Geology Group there were activities with Geofun, Bob Mizer’s Travelling Planatarium, Art and Geology on Flamborough Head and the University of East Anglia selling “Volcanoes Top Trumps”.

Our core attraction is the displays put on by our Local Groups and Affiliated Societies. We had a full house in the North and South cloisters and we would like to thank all the participants for their excellent displays, interspersed with our regular traders such as the BGS, The Bee Mine, Earth’s Wonders, Dr Dinosaur, Richard Tayler Minerals, The Rock Gallery and John Henry’s 19C Geological Maps. They all found the day most rewarding. The Rock Room in UCL’s Department of Earth Sciences was open with a display of Building Stones. Ruth Siddall used the opportunity to launch her new venture: Pavement Geology: www.londonpavementgeology.co.uk. The UCL Centre for Planetary Science was also opened for the day.

We welcome the partnership with UCL and hope that we can build on it in future years. We thank UCL and everyone who participated for making the day such a success.
Prizes & Council Nominations
Nominations are invited for the following:

Halstead Medal
The Halstead Medal is awarded for outstanding merit, deemed to further the objectives of the Association and to promote geology. Open to Members and non-Members.

Henry Stopes Memorial Medal (awarded once in every three years)
The Henry Stopes Memorial Medal is awarded for work on the Prehistory of Hominins and their geological environment. The medallist will be invited to deliver a lecture to the Association on his or her work or on some aspects of the subject. The award is open to Members and non-Members and can be awarded to one person, or two persons jointly.

New Recruits for Council
Nominations for new Council Members to be elected in May at the AGM are now being sought. Nominations must be supported by at least three members of not less than one year’s standing, and accompanied by a brief statement on the nominee and by the nominee’s written consent. Council members due to retire in May are Roger Le Voir, Paul Winrow and Anthony Brooks.

Nominations for the Halstead Fund, Stopes Medal and for new Council Members
must reach the General Secretary by 31st January 2015
Please email (or send by post) your nominations to the General Secretary
c/o Sarah Stafford at the GA office: secretary@geologistsassociation.org.uk

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

Elected July - December, 2014

- Ms Katherine Addison-Scott
- Mr Alistair Allsworth
- Mr James Carter
- Mr Timothy Charlesworth
- Mr & Mrs Alan and Vivien Dent
- Mr Stephen Dixon
- Mr John Evans
- Mr Martin Evans
- Mr Christopher Francis
- Andreea Marza
- Mr John Hodge
- Mr Adam Hodgkinson
- Dr Christina Fisher
- Mr Andrew Plumb
- Mr Joe Rivas
- Mr Jordan Wathen
- Mr Yasin Zargar
- Ms Sarah Jane Smith
- Miss Jenna Sutherland
- Dr Victoria Scorey
- Mr Lawrence Shaw
- Ms Sarah Jane Smith
- Miss Jenna Sutherland

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

- Felicity Secretan
- Michael Foster
- Robert Payne
- James Greenwood

An obituary for Robert Payne appears on page 14.

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.
Geology, geography and human affairs have combined to give Britain a rich history of mineral extraction which stretches back several thousand years. Changing technological, economic and social factors means that the character and scale of domestic extraction have varied enormously over this time span. These same factors have also influenced our level of trade in minerals and metals with the rest of the world. Cornish tin established Britain as a supplier of metal across the ancient world. Norman masons utilised huge quantities of dimension stone to build cathedrals and castles. Wooden ships sheathed with copper from South West England, Wales and the Lakes secured a global empire for Britain in the 17th and 18th Century. Indigenous coal and iron were the basis of Victorian and Edwardian prosperity. Aggregates for road building literally formed the foundation of the post-war ‘great car economy’. 

Economic globalisation, technology shift and changes in societal attitudes in the late 20th and early 21st Century caused a precipitous decline in domestic output of some minerals, notably metals and coal. The British seemed content to let the global market provide their material needs and happy to export the impacts of mineral extraction to other countries. However, by 2050 it is likely that human population will be close to 9 billion, economic power will have shifted from the West, environmental change will be accelerating and global competition for resources will be intense. In the face of this enormous challenge, will indigenous minerals make a comeback and increase their contribution to our security and prosperity?

Subduction zones are located where one of the Earth’s tectonic plates slides beneath another - this motion is controlled by the plate boundary fault zone. These plate boundary faults are capable of generating the largest earthquakes and tsunami on Earth, such as the 2011 Tōhoku-oki, Japan and the 2004 Sumatra-Andaman earthquakes, together responsible for ~250,000 fatalities. Although some plate boundary faults fail in catastrophic earthquakes, at some subduction margins the plates creep past each other effortlessly with no stress build-up along the fault, and therefore large earthquakes are not generated. Determining what controls whether a fault creeps or slips in large earthquakes is fundamental to assessing the seismic hazard communities living in the vicinity of plate boundary faults face and to our understanding of the earthquake process itself. In the last 15 years a completely new type of seismic phenomena has been discovered at subduction zones: “silent earthquakes” or slow slip events. These are events that release as much energy as a large earthquake, but do so over several weeks or even months and there is no ground-shaking at all. Slow slip events may have the potential to trigger highly destructive earthquakes and tsunami, but whether this is possible and why slow slip events occur at all are two of the most important questions in earthquake seismology today. Importantly, there is recent evidence that slow slip preceded and may have triggered two of the largest earthquakes this decade, the 2011 Tohuku-oki and 2014 Iquique, Chile earthquakes. Therefore, there is an urgent societal need to better understand slow slip events and their relationship to destructive earthquakes.

In this talk we will discuss the various types of fault slip behaviour that have now been discovered at subduction margins and delve into the new techniques that we are using to learn more about them in an attempt to ultimately crack the code of why some subduction megathrust faults slip in devastating earthquakes and some slide silently.
Evening Lecture: Overturning our understanding of the Ediacaran fauna
By: Dr. Alex Liu School of Earth Sciences, University of Bristol

For many years, it has been accepted that the fossil record of animals can be traced back to the base of the Cambrian Period, around 541 million years ago. Prior to this point in Earth history, evidence for the presence of animals was scarce. Recent fossil discoveries, combined with new molecular analyses, have suggested that the earliest animals evolved in the Neoproterozoic Era, perhaps as much as 200 million years before the Cambrian. Fossils of large, complex, soft-bodied multicellular organisms that lived in the interval just prior to the Cambrian, and widely termed the "Ediacaran biota", are a key line of evidence in this debate. However, the unusual body plans of many of these fossils have defied classification, and there has been much discussion about whether they represent animals or entirely different groups, or even their own extinct Kingdom. In this talk I will outline the current state of knowledge surrounding the Ediacaran biota, and will discuss the new findings and discoveries that are finally shedding light on what these enigmatic organisms may have been. Rather than being a confusing assortment of ultimately failed biological 'experiments', the Ediacaran biota record a diverse, thriving ecosystem that likely contained algae, bacterial colonies, protists, and some of the earliest animals. Such ecosystems thus paved the way for the complex animal-dominated marine communities of the Cambrian.

Evening Lecture: From coccolith to oil the hard way: a food chain in the Kimmeridge Clay of Dorset
By: David M. Martill & Steve Etches

The Jurassic Kimmeridge Clay Formation is the UK’s single most important stratigraphic unit, being the source rock for most of the North Sea oil reservoirs. The oil is a consequence of the breakdown of buried organic matter, which, in Dorset, may make up to 30% of the Kimmeridge Clay at some horizons. This high organic carbon content reflects high productivity in the surface water during the Jurassic with super abundant phytoplankton feeding an equally abundant zooplankton, of which we know very little.

Exposures of the Kimmeridge Clay Formation along Dorset’s World Heritage Jurassic Coast provide a unique window to the phytoplankton, and also to the other end of the food chain, where giant pliosaurs and crocodiles were the dominant carnivores. In between these microscopic algae and giants was an extremely diverse assemblage of invertebrates (molluscs, echinoderms and many more) and vertebrates, including more than thirty different fish species, ichthyosaurs, turtles and long-necked plesiosaurs. Every component of the assemblage was eating another. Waiting for the droppings below was a sedimentary soup inoculated with a cocktail of bacteria that, with the aid of a bit of heat and pressure, turned it all to gas and oil.
Book Review: Stone to build London - Portland’s Legacy

By: Gill Hickman

Report: Geoff Townson

As a geologist who studied and worked in various Portland Stone buildings on both banks of the Thames, this book is a delight!

In the 1950s the author sat at her Granny's knee to hear tell that “Portland is a special place because it is a Royal Manor and belongs to the Queen”. Granny told of her Portland ancestors and the quarrying trade that has existed, on and off, since Roman times and with London since 1350.

This is a lavishly illustrated book with 325 photos (over 75% colour) and 35 maps and diagrams. It should appeal to geologists, archaeologists, historians, building engineers and architects alike.

Part One is a brief overview, followed by Part Two (nine chapters) which cover the history of quarrying and the use of Portland Stone in London and the Empire from 1600 onwards. Part Three comprises a tour of 135 of London's Portland Stone buildings and monuments with seven maps and 111 colour photos. For visitors to this Dorset peninsula, there follows a guide with a map and 16 colour photos. Five Appendices cover the geology, quarrying methods, exports and examples beyond London: UK, Eire, Belgium, Denmark, Japan and the USA (e.g. the Mason-Dixon monument 1751). This book reveals the history of The Isle of Portland, not only the quarrying and stone export but its interlinked land ownership and agricultural history.

There are some fascinating gems about quarrying on the Royal Manor and the use of the stone in London, especially since 1600 – in particular the impact of London's economic and political history on the development of the Portland stone industry. Local personalities have played a fascinating role, especially in the 18th Century. Links with London scientists are mentioned, e.g. "The father of modern science" Robert Hooke, who concluded in 1665 that fossilised objects like petrified wood and fossil shells, such as ammonites, were the remains of living things, a conclusion praised by Charles Lyell in his Principles of Geology (1832).

I have often been surprised that so many buildings and memorials (e.g. war graves) could have come from such a small Dorset peninsula but Gill’s maps reveal the extent of the quarrying over the years, from coastal landslips to inland quarries and nowadays, adit mining. I estimate that quarrying has taken place over some 3.5 km2.

Geologist, the Rev. Townsend (1813) listed the Portland Stone as the Superior Oolite – he was right in every sense! the last few years.

http://www.bradford-on-avon.org.uk/

The incredible story of the Stone Pipe Company 1805-1815

October, 2014

Hugh Torrens

This lecture first reflected on the history of water supply, and its geology, and, particularly, on the problems caused by the high initial capital costs of all such ventures. The main part of the lecture concerned the forgotten activities of the Stone Pipe Co. (SPC) at Guiting, high up in the north Cotswolds. The speaker was at pains to correct the misconceptions from a publication by David Bick, entitled An incredible Georgian fraud, that these activities were a) ever fraudulent or b) were restricted to activities in Manchester alone.

The leading light in the SPC was Sir George Wright (1769-1809), whose father, Sir James Wright (1730-1804), had been a Groom to the King's Bedchamber and Ambassador to Venice and owned a factory in Woodford, Essex, making artificial roof slates and water pipes. In 1805, a patent for stone pipes was registered by Sir George and he established the SPC. The famous John Rennie was their chief consulting engineer from the start (and was not brought in later, as has been claimed). Wright’s architect was John Papworth, who was soon employed to run a SPC works in Dublin, after the main English manufactory had moved to Paddington. These little-known Dublin works used what was described as 'Irish marble', but it seems more likely much, at least, had come from Anglesey.

Other SPC partners included Henry Wright, Richard and Samuel Hill from Knutsford, Cheshire, and William and George Boulton Mainwaring from the Cheshire/Staffordshire border.
The company had initially used Portland Stone to make its pipes, but this proved both expensive and very hard to work. So the company moved to the north Cotswolds, to utilise the yellow Guiting Stone, found here at quarries at or near the Tallyho Quarry, Foxhill. This proved soft enough to extract, and saw easily, and provided uniquely large-sized blocks, up to over 2m deep and 4.6m long.

In early 19th century London, there were already many individual companies competing to supply water, the demand for which was increased by the requirement for delivery to higher floors of buildings, which then entailed the use of steam power. The Royal Society of Arts in 1804 offered an annual premium to anyone inventing a substitute for the elm pipes that had been used up to that time, since their taper joints were never water-tight, and these pipes lasted less than 20 years, with up to 25% loss from the reservoir to basins normal. Alternative iron pipes proved both expensive, and to produce a rusty ochreous water, and so those associated with the SPC started to recommend the experimental use of stone pipes, which were expected to prove suitable, longer lasting and cheaper. A contract was won in 1807 to supply 4 miles of pipes to the West Middlesex Water Co from the Cotswolds, but there were delivery problems due to the scale of the contract, and so more plentiful, but more expensive, iron had to be used instead.

Early in 1808, John Rennie sought the opinion of renowned engineer James Watt senior on the use of stone pipes. To prove Watt’s approval, William Murdoch, Watt’s best mechanic, was asked to design an improved device for boring properly circular pipes (using a trepanning saw). Rennie, as chief engineer for the SPC and the water companies in London and Manchester, was strong in his advocacy for stone pipes, giving evidence to Parliament for the Manchester Waterworks Bill in 1809 and the Grand Junction Waterworks Bill to supply London in 1811. With large capitals, the SPC contracted with Manchester Waterworks to supply 15 miles of 8-inch pipe and 45 miles of smaller pipes, and with the Grand Junction Company in London for 13,000 yards of 3- to 8-inch diameter stone pipes and 830 yards of 42-inch cast iron main.

There were probably more than 3 quarries, and a large factory at Guiting Power in the Cotswolds, involved in this massive supply of stone pipes to the growing cities of London and Manchester. Newspapers were full of information about their activities. A railway was built to run from the largest quarry to the works, where there were probably two 30hp Boulton and Watt steam engines. Evidence of the extent of the operation could be seen, until a few years ago, in the scores of up to 12-inch internal diameter cores seen in local walls, while surviving stone pipes can still be seen at the London Museum of Water and Steam (formerly the West London Waterworks), and at various Manchester locations. However, the sheer scale of operations continued to cause delivery problems. Attempts to solve these came via specially planned links, first, to the national canal system, then, when this failed to get parliamentary approval, a special railway to docks on the River Severn. When this too failed to get planning permission, for a while, 30 tons/day were leaving the works in wagons through Cheltenham to Gloucester, causing severe damage to local roads.

Significantly, the way the pipes were manufactured meant that more small pipes were available than large ones. This then caused delays in completing even parts of the system. When this was possible, in July 1812, in 4 London streets near Baker Street, there were 135 failures due to burst pipes and/or bad joints. The pipes proved simply not strong enough to withstand the higher pressures needed to supply higher levels in West End houses. This meant that “stone pipes had received their death sentence” and the company was forced to repay a large proportion of the sums it had received for the pipes it had supplied. It was then unable to meet its bills in other places, like Manchester and went bankrupt. The London bank of Mainwaring and Company, run by partners in the SPC, also went bust, with liabilities of £82,000, including £11,000 to the Bank of England.

Conclusions

The use of SP had been recommended on ‘good authority’. They were then cheaper than iron, but they went catastrophically wrong, though this was never intentionally fraudulent. The failure of the SPC arose largely from the then-current inadequacy of means of testing materials, before they were commissioned, resulting from the insatiable and urgent demands of water companies for pipes. The interactions of the new systems and the high steam pressures required caused the problem, rather than simply the failure of individual components. These failures led first to the much more systematic testing of materials after 1812, and also to a parliamentary statute that iron alone was to be used for main water pipes. The speaker concluded that historians need to address the history of failure a bit more, since we can learn more from failure than from success.

Dr David Brook OBE
On a warm sunny morning the group congregated at the Sound Cafe at the southern tip of the Isle of Man for an introduction to Manx geology. As well as GA members our numbers were swelled by members of the recently formed Isle of Man U3A geology group, some of whom were with us the entire trip, while others joined us for specific parts, so our numbers varied from 10-18.

The Isle of Man forms a crucial piece of the geological jigsaw that makes up the continents of NW Europe and North America. The southern two-thirds of the island are composed of early Ordovician sediments of the Manx Group. They were originally deposited 485Ma in a deep water environment and then underwent low grade metamorphism during the Caledonian orogeny (400Ma). The strata has a NE-SW strike that extends up to the Lake District and down to Leinster, Ireland, both of which have very similar rocks. Dating specific sequences of the Manx Group is tough as it contains very few fossils. There are areas where the geology is understood but understanding the relationship of one formation to another is uncertain in many cases.

Along the west coast at Niarbyl Bay are very similar rocks, which have a different age. The Dalby Group is 60Ma younger than the Manx Group and were deposited during the Devonian. Early Carboniferous rocks are found in the south at Castletown and finally glacial deposits (10,000y) cover the northern plains. In addition the Manx Group contains several granite bodies sitting within it that keeps it buoyant; these were emplaced during the Caledonian Orogeny.

The Isle of Man has been an island since the last glaciation. It was also an island during the Devonian (but probably a different shape). Normal and thrust faults were active in the Devonian and Carboniferous. Numerous Tertiary dolerite dykes cut the rocks, mainly on the coastal sections, most have a NW-SE trend but there are also some that run W-E. There is also a set of faults related to the Caledonian Orogeny and the closure of the Iapatus Ocean.

The Chasms, in the Mull Hill Formation (Lower Ordovician), are characterised by thick-bedded quartzites, these are turbidite deposits. Using a whiteboard (which along with the marker pen was probably the most useful piece of equipment on the trip, excluding the minibus!), Dave diagrammatically explained how these deposits formed. We then moved onto the Lonan Formation at Port Erin, still turbidites, but much finer grained and folded. They had been deformed during the Caledonian Orogeny, and displayed 2 or 3 cleavage plains due to compression. (Figure 1) Still the same formation, at Spaldrick there was a lot more mudstone with streaks (clasts), this was a ‘debrite’. This type of deposit is formed by debris flows that occur when slopes become unstable and suddenly collapse ripping up the surface below them.

We then crossed W-E, stopping briefly at Keristal to look down at a parasitic fold on the flank of the Douglas syncline. Still in the Lonan Formation and the same composition as the Mull Hill Formation seen earlier, but it is not known if it is the same provenance. We finished the day at Marine Drive examining the sandstone rich turbidites of the Sark member. (Figure 2) The strata here are nearly vertical and younging inland.
Saturday started with a visit to the Laxey Wheel. The Lady Isabella water wheel was built in 1854 both as a tourist attraction and to pump water out of the mine, whose workings extended 335m below sea level. The lode (galena, sphalerite, chalcopyrite) had a N-S trend, dipping steeply to the east, which was offset by several faults and was eventually lost to the north. We then moved on to the Viking stone crosses at Maughold Church, where we were met by Sir David Wilson, former director of the British Museum, who explained some of their history and how they illustrated the adoption of Christianity on the island. We also looked at what the crosses were made of, whether it was local and if not speculated on where it could have come from. (Figure 3) The final stop of the morning was Port Mooar, and more turbidites, these were medium–bedded and there was not a huge amount of bioturbation, with inter-bedding of sandstone and mudstone and cleaner than those seen yesterday at Marine Drive. The differences in appearance of the turbidite deposits was due to the area of the fan they had been deposited in, the courser, thicker deposits are from near the centre while the finer deposits are from near the edges. We then walked over to the other side of the bay to find the dolerite dyke there. Although 10m wide, it wasn’t easy to see, and even our leaders had problems, but once found it was obvious.

We had a brief stop at Guthrie’s Memorial on the northern escarpment for an overview of the northern plain and its Quaternary glacial sediments before crossing E-W. We finished the day at Niarbyl, Creggan Mooar Formation (Mid-late Arenig), fine grained turbidites, mostly mudstones with odd brown layers which are manganese rich (coticate). The rocks here are deformed, with folding, fracturing and quartz veins associated with the Caledonian Orogeny. As we moved further north across the bay the rocks got even more deformed with the quartz veins broken up and an intrusion of greenstone. At the fault zone we see the ‘meeting of two continents’. This is part of the Iapetus suture. (Figure 4) On the north side is the iron rich sandstones of the Dalby Group (Mid-Silurian). There is no bioturbation in this sandstone which suggests it was deposited in a narrow ocean in anoxic conditions.

Sunday we started at the Arches, Langness and the unconformity between the Manx Group and conglomerates at the base of the Castletown Group (Lower Carboniferous), a 150Ma gap that includes the Caledonian Orogeny. In addition there was also a normal fault. We then followed the unconformity round into the next bay as it dipped down and located another fault which brought the conglomerate back up. Moving round to the other side of the bay we walked round Scarlett Point, taking in the anticline in the Carboniferous limestone on the foreshore and the dolerite dykes that cut through them. The Scarlett Volcanic Formation, foliatic basalts, magma that has come up from great depth, typical of a rifting environment. The two main rock types are volcanic breccia and pyroclastic rocks. We examined the direction of the bubbles in the vesicular basalt blocks. It was a fissure eruption with lava coming up and solidifying, then more lava coming up and flowing over, until eventually the whole structure flopped over, so the bubbles are horizontal rather than vertical.

The first of our afternoon stops at Polly vaish had been taken over by motorcycle scramblers, so we had to give it a miss, starting instead by examining some slabs from the local ‘black marble’ limestone quarry, before walking south along the coast.
The beds here are very finely laminated indicating deeper water deposition, they become folded, and then we were back into volcanic breccias. Several lenses of limestone were interleaved with the volcanics, indicating that at least some of the eruptions were on the sea floor, confirmed by some excellent pillow lavas. (Fig. 6) We managed to find an alternative site near where we’d parked the minibus to study the algal mounds, built up on limestone banks that contained lots of crinoids and shell fossils. The algae needed light to grow, so the water would have only been 1-2m deep. We finished the day looking at Siphonophila fossils in a wave cut platform.

Our final day started at Foxdale Spar quarry. The granite here is mostly medium grade and was emplaced during the Caledonian orogeny. The pegmatites are late stage and contain rare vugs with free-grown crystals, a few good examples were found. We reluctantly moved onto Peel Hill, where we explored the disused slate quarries there. They are on the same trend as the Manx Group but are part of the Dalby Group. What we found was fine laminated silts and fine grained sandstone, a hemipelagite mixture of turbidites and pelagic material and no bioturbation.

As the minibus had to be returned by 5pm the afternoon stop was dropped and after a group lunch at the Creek Inn, we walked along the Prom to look at the red sandstone at the northern end. This was lain down in the Lower Devonian when the Isle of Man would have been just south of the equator. There was evidence of life and we were challenged to find the trace fossil as well as examining the sedimentary features. We sadly failed.

After thanking both Dave Burnett and Dave Quirk for a most enjoyable and educational trip, we ended the trip with a well earned visit to the ice cream parlour.

Robert (Bob) Payne

Bob was born in North London and started work in 1943 in the building & construction industry, progressing to senior site management on contracts all over the London area and Scotland. He had spells working abroad, in Khartoum, Gibraltar, Kuwait, Muscat and Bahrain.

On retiring in 1992, having had some interest in Geology, he took up evening classes at Ware College run by Dr. Steve Purkiss. Steve ran weekend trips to local sites of geological interest, plus weekends away to Scotland, the Lake District, South Wales, the Mendips, Bracklesham Bay, Northumberland, Derbyshire, Anglesey; wherever they went, Bob went too. During this time Bob also joined many trips abroad with the G.A., with Bristol University (6 trips to various parts of N.W. Scotland with Dr Peter Hardy) and with Sheffield University. Every one of these was meticulously written up, cross referenced with photographs, of which there were over 3000. All this information from 91 field trips was collated into 27 Lever arch files. The places Bob visited are numerous and various, including Hungary, North America (3 times), Canada (twice), Namibia, South Africa, Iceland (at least twice), Oman, Libya, India, the East African Rift Valley, Portugal, Bavaria, the Italian volcanoes, Newfoundland and British Columbia.

The spare bedroom in Bob’s house was his rock museum and library. Shelves on every spare bit of wall filled with over 500 rock samples, all carefully numbered and recorded on a card index system, noting rock type and place of origin. Again all cross referenced into the field trip records.

In 2001 Bob joined the Hertfordshire Geological Society and the Cambridge Geology Club; he also attended the Shell Lectures at the Geological Society and, for a time, many of the lectures at the Natural History Museum. It was at the Hertfordshire Geological Society that one of us (HB) crossed Bob’s path for the first time. Having spent numerous evenings collating the next year’s lecture programme, I was saddened that on its publication it was greeted by the comment “what a load of old ****” from a member of the audience. I knew that next year I should consult Bob first. He was a man who knew what he liked and wasn’t afraid to say so. Bob was at heart a “hard rock and structural man” who said that he was never interested in fossils, but when we checked his book shelves there were more books on fossils than any other subject.

Bob was a dedicated, enthusiastic geologist with a fantastic ability to record all his trips on paper, as well as photographically. This will be his legacy, as all those cross referenced field trip notes, field guides, photographs and specimens, which fill over thirty boxes, will form part of the Geologists’ Association Carrack Archive and will be stored and available from the BGS store in Keyworth.

He was an accomplished joiner, producing some really top quality pieces, as well as the shelves which housed his collection. He is survived by his wife Barbara and his two children, Tony (a glaciologist) and Susan (a librarian). He will be sadly missed by all of us.

Charlie Norcott & Haydon Bailey
On a wonderfully sunny dry morning we assembled at the Ashwell & Station Car Park and our first task was to get a parking ticket out of a very temperamental machine which resulted in one chap pushing the BIG green help button in frustration.

After collecting ourselves and checking our Personal Protective Equipment (PPE) we listened to the safety briefing and followed Haydon into the Steeple Morden Quarry. What a site to behold when our eyes first caught sight of the expansive white excavation. We had just travelled back 93 million years into the Cretaceous Period! In front of us was the lower unit of the ‘White Chalk Subgroup’ called the, ‘Holywell Nodular Chalk Formation’ and half way up was the base of the ‘New Pit Chalk Formation’ but at this very moment it all just looked very, very white! The colour is testament to how pure the chalk is (calcimetry) and why it is in the White Chalk Subgroup and not part of the Grey Chalk Subgroup.

As we proceeded closer to the face the south easterly dipping beds became clearer and numerous. The dip is due to a nearby gentle syncline and anticline system. Haydon explained that each bedding plane is a break in deposition and each cycle represents between 100,000 and 400,000 years. On closer inspection these bedding planes are grey anastomosing marl seams which are detrital or volcanogenic in origin. Dotted along some of the planes was red staining which is sea floor oxidation where sponges tended to concentrate.

Criss-crossing the beds are four differently orientated joints set. The inspected joints ranged from steeply dipping (800) to low angled (300). Those inspected were either planar or undulating. The latter joints provided excellent secondary permeability flow paths for water. One joint was covered in a waxy iron stained clay and was very tight. These joints showed no indication of movement such as displacement or slickenside.

After looking at the joints I turned around to see someone eating the Holywell chalk which is a fair assessment of the grainy nature of the chalk which is richly populated with numerous fine grained broken shells. This was about the time we found out that the chalk is used as filler in such foods as cornflakes and Horlicks!

The palaeontologists in our group soon got to work and found some impressive inoceramid bivalves called Mytiloides, echinoids and brachiopods along the base of the quarry. We scrambled up a perfectly positioned stockpile which brought us eye to eye with a band of black brittle siliceous flints of various sizes. There was an inconsistent band of nodular shaped flints approximately 0.5m above from a continuous band of haunting human finger shaped flints which caused some amusement. Naturally the guaranteed classic first question was asked, ‘how were they formed?’

In the later part of the Cenomanian and the Early Turonian, sea levels began to rise rapidly, 400m above where we stood earlier on the quarry floor. The shallow marine environment had planktonic (floaters) or benthic (bottom dwellers) foraminifera (single celled organisms with an organic or carbonate rich shell) which thrived along with other life mentioned earlier whose shells settled on the sea floor and mixed with the decaying algae to form the chalk.

The flints started to form soon after the deposition of the chalk. With the aid of bacteria the silica replaced the calcium carbonate and went into solution. On burial, this biogenic silica rapidly passed into solution. With greater burial anaerobic decomposition of organic matter in the sediment under the action of sulphate reducing bacteria released hydrogen sulphide which diffused upwards to the boundary between the oxidising and reducing zones. The silica precipitated out and altered to quartz, however the cyclic sequences of clay deposition inhibited the formation of flints in the Holywell Nodular Chalk and New Pit Chalk which is why there are only a few marker flints such as the finger like flints and the nodular flints which were formed where saturated pore fluids mixed along horizontal fractures.

From the top of the stockpile we could see the conformable change from the top of the rich shell detrital Holywell Nodular Chalk to the relatively poorly fossiliferous relatively smoother and weaker New Pit Chalk. Between the two flint horizons is a thin pair of marl seams, some 15-30cm apart, of which the upper and generally thicker (up to 1cm) seam, is known as the Odsey Marl after the local manor house. We could now define the base of the New Pit Chalk Formation which is marked by the predominantly vertical, ‘white skinned’ burrow-fill replacement flints. These flints are known as Glyndebourne flints.

On leaving the quarry we drove to Ashwell and stopped to admire the spring where the River Rhee rises. After a hop skip and a jump across the stepping stones we could see the
spring line pouring out from under the bridge which had been calculated to be the surface elevation of the Totternhoe Stone.

After lunch we wondered to the pretty medieval Ashwell Church which is constructed from local Totternhoe Stone, which is from the Grey Chalk Subgroup. As we huddled in the tower of the church, Haydon explained the stone was deposited in a river channel which carried chalk clasts and were washed with sharks teeth, fish scales and ammonites from higher ground approximately 510 million years ago and were compacted and chemically altered to rock over time. As we looked at the walls we noted the chemical weathering of this rock creating lots of bubbles then something quite significant! Etched in the wall was Medieval graffiti! The writing is believed to be a recording of the Black Death and records the occurrence of a great storm and below these incomprehensible words is a drawing of St Pauls Cathedral before the 17th Century fire of London.

All in awe we left the church, noting more modern engraving of a 1970’s rock group. After all wandering in different direction we all gathered and peered over the brick wall of someone’s back garden to look at some more white rock!

This is the Plenus Marl, curious...I was expecting to see a thick band of dark grey marl. As our eyes adjusted, the Plenus Marl member became a cyclic sequence of alternating marly claystones and argillaceous limestone, a series of protruding stronger limestones overhanging eroded pale grey/pale orange marls. This important lithological marker was subdivided by Jeffries in 1963 into eight beds; each characterised by a distinctive fauna and demonstrated that these could be traced around the Anglo-Paris Basin. Thankfully Haydon pointed out that bed six is the iron stained bed at the top as no one had brought their SEM!

The Plenus Marls mark the Cenomanian-Turonian boundary event which represents a major stage boundary and was a period of major biotic and oceanographic change. At the base of the sequence boundary the sea level dropped to an all-time low (low stand system) and transgressively rose through bed three and continued to the ‘high’ in bed eight.

During the late Cenomanian there was a period of high organic burial that the oceans became completely deoxygenated, ‘anoxic’ and gradually became more acidic. During this time the atmosphere was rich in carbon dioxide and the forams became extinct as you move up the stratigraphy. This is known as progressive extinction.

A second theory suggests that the faunal change is demonstrated to be largely a pattern of immigration-emigration rather than true extinction, and the stratigraphic sequence was coincident with major sea-levels changes. The onset of the Middle Chalk is interpreted to mark the breakdown of shelf-break fronts and the spread of poor nutrient waters by a rise in sea levels.

The pre-Plenus unconformity marks the boundary between the White Chalk and the Grey Chalk Sub-groups. This was more apparent further along the wall where there were two faults and Bed six had been displaced upwards by approximately 0.3m.

We returned to Steeple Morden to the neighbouring Plantation Quarry. Here the chalk faces were much lower with less stratigraphy exposed in each ‘wall’. However, some recent excavation had exposed excellent examples of the Mytiloides Flint layer.

The day closed with a sincere thanks to our Leader Haydon and Geoff Swann expressed the Associations’ appreciation to the leader and to OMYA quarries for allowing us to see past the ‘white rock’ and journey through the end of the Cenomanian to the start of the Turonian.
Further details are available on request from the GA office. Please indicate when booking, if you are able to offer a lift or be physically demanding. If you are uncertain, please ask.

OVERSEAS EXCURSIONS.

Geoff Swann organises UK Field meetings and Ian Sutton is responsible for overseas excursions. Some meetings may have restrictions on age (especially for under 16s) or be physically demanding. If you are uncertain, please ask.

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.

SAFETY IS TAKEN VERY SERIOUSLY should you be unsure about either the risks involved or your ability to participate safely, 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.

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 (see GA Circular No. 942, October 2000 for further details). 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.

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Our final stop, time permitting, will be to see the atmospheric Rollright Stones and Whispering Knights. **Equipment:** You must have a hard hat, appropriate clothing and footwear. Please bring a torch.  
**Cost £10.** Due to the visit to a 50 foot deep mine numbers will be limited to 15 FIT individuals.

**WEALDEN EXCURSION – joint meeting with the Hastings & District Geological Society**  
**Leaders:** Ken Brooks, Peter Austen and Ed Jarzembskiwski

**Sunday 26 July**

Following the last two years’ field visits covering the coastal sections between Cliff End and Fairlight Glen, we will be looking to complete the final section of this classic 5 mile lower Wealden coastline from Fairlight Glen to Rock-a-Nore. Once again the exact details of the field trip will not be known until nearer the time as it will depend on access conditions at either end of the section.  
**Equipment:** You must bring a hard hat and suitable footwear. Packed lunch. We will be walking along the beach over shingle and some rocks which may be slippery. Care should also be taken to keep away from the base of the cliffs in case of rock-falls, particularly after wet weather.

**GEOLOGICAL HIGHLIGHTS OF MARTLEY, WORCESTERSHIRE – joint meeting with the Teme Valley Geological Society**  
**Leaders:** John Nicklin and others

**Saturday 8 August**

The Martley area is geologically varied and represents in micrcom the geological variety of the British Isles. We will be following one or more of the TVGS’ geological trails though details are still to be decided. More information on the area can be found on the TVGS website http://www.geo-village.eu/  
**Equipment:** You must bring a hard hat and suitable clothing and footwear. Bring a packed lunch.

**THE GEOLOGY OF RECULVER COUNTRY PARK**  
**Leader:** Geoff Downer

**Sunday 23 August**

We will study the early Palaeogene sediments of this, the type locality for the Thanet Sands Formation and the overlying beds along the stretch of coast in North Kent between Bishopstone and Reculver. We shall also review the various measures taken to protect sections of this coastline and the reasons behind these schemes. In the afternoon we shall examine two stretches of coast in North Kent between Fairlight Glen to Rock-a-Nore. We will finish at about 16:00 on Sunday.  
**Equipment:** Participants should be equipped for very rough beaches and should have stout footwear with ankle support. Helmets and hi vis jackets are essential. There may well be some steep ascents (and descents) dependent on the weather.  
**Cost & booking:** Numbers will be limited to 25. Register with Sarah Stafford at the GA office sending an administration fee of £15 to confirm your place.

**THE LOWER THAMES GRAVELS**  
**Leaders:** David Bridgland and Peter Allen

**September 2015 (date to be confirmed)**

This meeting leads on from the QRA conference in 2014. We will visit classic sites in the Lower Thames including Wansunt Pit (Dartford Heath), Swanscombe Skull Site NNR, Purfleet (Greenlands Quarry) and Lion Pit Tramway Cutting. Transport will be by coach from a central London (Embankment) pick up plus a local station pick up and drop off. Car users should note that we’ll start and finish on different sides of the river.  
**Cost** will be approximately £25 (transport included) and attendees will be able to buy this year’s QRA field guide for £15.00.

**IN THE PIPELINE (Dates and details to be arranged)...........................**

**THE CHALK OF MARGATE**  
**Leader:** Haydon Bailey  
**Date to be confirmed**

**THE BUILDING STONES WALK IN LONDON**  
**Leader:** Ruth Siddall  
**Date to be confirmed**

**Another of Ruth’s popular walks on a summer evening**

**THE GEOLOGY OF THE SEVERN VALLEY RAILWAY**  
**Leader:** Peter Worsley  
**June – July 2015 date to be confirmed**

We’ll combine geology and steam nostalgia at its best on one of the UK’s leading preserved railways.

**THE BUILDING STONES OF ST ALBANS**  
**Leader:** Di Smith  
**Date to be confirmed**

This meeting has been carried over from 2014. We will be looking at a variety of building stones of various ages including those of the cathedral. The walk will last approximately 2½ hours and will not be strenuous. Afterwards it is possible to visit the Verulaneum museum with its collection of Roman and related artefacts.

**BUCKS GEOLOGY**  
**Leader:** Jill Eyers  
**Date to be confirmed**

We are still hoping that this meeting will take place subject to access problems being solved. We will visit several quarries, one of which has been restored in part by a grant from the Curry Fund.  
**Equipment:** Hard hat and hi-vis jacket. Appropriate clothing and footwear. Attendees should be capable of dealing with the conditions in working quarries.

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**OVERSEAS FIELD MEETINGS IN 2015**

**PORTUGAL**  
**Leaders:** Diamantino Insua Pereira, Universidade do Minho; Pedro Cunha, Universidade do Coimbra; Antonia Martins, Universidade do Évora; Prof David Bridgland, University of Durham  
**Monday 11 – Tuesday 19 May**

8 days in Portugal starting in Porto and working south to Lisbon with overnight stops in Porto, Machedo de Cavaleiros, Foz Coa, Coimbra, Ródão, Abrantes, Almeirim and Lisbon. The trips will include the Knights Land Geopark (Day 1), the upper valley of the Douro River and the UNESCO Prehistoric Rock-Art Site in the Côa Valley, a World Heritage Site (Day 2), Alto Douro wine region World Heritage Site (Day 3), cruise on the Tejo River into the Portas do Ródão gorge and visit to the “conhal” do Arneiro open-air Roman gold mine and Palaeolithic sites (Days 5), archaeological sites in the middle reaches of the Tejo River including the Archaeological museum of Vila Nova da Barquinha (Day 6) and Quaternary sites between Almeirim and Lisbon on Day 7.  
**Level of fitness required:** some sites will involve fairly lengthy walks in quarries and along tracks.  
**Travel** will be by coach within Portugal but participants will need to make their own travel arrangements.

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arrangements to and from Portugal. There will be an opportunity to extend your trip at either end to enjoy the cultural sites of Porto &/or Lisbon.

**Cost & booking:** Register with the GA office know if you are interested in this trip and full details of itinerary will be sent to you. Costs will be circulated as soon as they are confirmed. They will include hotels B&B, coach travel and entrance fees where applicable.

**GREEK ISLAND VOLCANOES**

**Leader:** Paul Olver

**Monday 14 – Sunday 27 September**
The trip visits the Islands of Crete, Santorini, Kos and Nisyros to explore this area of high volcanic and earthquake activity where the African and Aegean plates meet. There is ample scientific evidence to suggest that massive eruptions and their associated tsunamis nearly 4000 years ago wiped out much of the Minoan civilization on Crete and it is the stuff of popular legend that the fabled lost city of Atlantis sank beneath the sea as a result of similar volcanic activity. More recently, Santorini has seen periodic eruptions in the 20th century and increased seismic activity has been registered there very recently.

**Level of fitness required:** The excursion will be using locally-hired coaches and will mainly involve short walks on uneven ground away from the coach or, when visiting the limestone caves on Crete. There will also be flights of steps at some locations. On two days, there will be longer walks both of which are also undertaken by members of the general public so will require normal levels of fitness. There will be no climbing or difficult terrain involved.

**Cost & booking:** The tour will be handled by Norman Allen Group Travel and the price per person is £1729 which includes return flights, transfers, 13 night’s hotel accommodation of which 6 nights are half board and 7 nights B&B, coach travel to sites, ferry crossing, entrance fees and guides. Full details from Paul Olver, The Butterdike, Wellington Lane, Canon Pyon, Hereford HR4 8NL, Tel: 01432 761 693, email:paulolver@hotmail.com.

**GEOLOGISTS’ ASSOCIATION LOCAL GROUPS (LG) & AFFILIATED SOCIETIES**

**Amateur Geological Society**
Contact Julia Daniels 020 8346 1056
Email: starfields@tiscali.co.uk
Field trips: john.wong@hertsc.gov.uk
www.amgeolosc.webspace.virginmedia.com/Live_site/Home.html

**Bath Geological Society**
**February 5** AGM followed by Searching for ancient earthquakes in the interior of Asia – Dr Richard Walker
**February 28** Field meeting: Brown’s Folly Nature Reserve – Members of Bath Geological Society

**March 21** Field meeting: Jurassic rocks of Oxfordshire – Elizabeth Devon
www.bathgeolsoc.org.uk

**Belfast Geologists’ Society**

**December 8** What lies beneath? Peering into Basalt cover basins from India and Ulster – Dr Rob Raine
Contact peter.millar@nireland.com
www.belfastgeologists.org.uk

**Black Country Geological Society**

**December 8** Christmas Social

**January 31** Geo-conservation Day: Another visit to Barr Beacon and Pinfold Quarry – Andy Harrison and Helen Sanger.

**March 16** AGM followed by Minerals and Gems of the Cairngorms – Roy Starkey
Contact Linda Tonkin: secretary@bcgs.info
www.bcgs.info

**Brighton & Hove Geological Society**

**January 7** La Dolce Vita: a geological and geochemical tour of Italy – Prof Andy Cundy

**February 4** The magic of Flint: a never ending story – Prof Rory Mortimore

**March 4** Solving Darwin’s dilemma: the barnacle fossil record – Prof Andy Gale

**March 18** AGM and Members’ Evening

**April 1** Foraminiferal facts: from Cretaceous palaeoclimates to Caribbean tephrochronology – Dr Jodie Fisher
Contact John Cooper 01273 292780 Email: john.cooper@brighton-hove.gov.uk
www.bhgs.org

**Bristol Naturalists’ Society**
Contact 01173 470486 Email: simoncarpenter@yahoo.com
www.bristolnats.org.uk

**Cambridgeshire Geology Club (LG)**
Contact Ken Rolfe 01480 496973, mob: 07777 678685
www.cambridgeshiregeologyclub.org.uk

**Carn Brea Mining Society**

**December 9** Members Medley led by the Society Vice Chairman. Members will present a series of short talks.

**January 20** The St Just 20 years later – Jon Brooks. Jon will describe the latest mining work carried out by the National Trust in West Penwith
Contact Lincoln James 01326 311420
www.carnbreaminingsociety.co.uk

**Cheltenham Mineral and Geological Society**

**Lectures contact Ann Kent 01452 610375**
Field trips contact Keith Vickers 01453 827007
http://cmgs.yolasite.com

**Cumbrian Geological Society**
For details on the activities of the Cumbrian Geological Society
www.cumberland-geol-soc.org.uk

**Cymdeithas Daerseog Gogledd Cymru: North Wales Geology Association (LG)**
Contact Jonathan Wilkins 01492 583052 Email: Wilkins@ampyx.org.uk
www.ampyx.org.uk/cdgc

**Cymdeithas Y Daearseogwr Gryw De Cymru: South Wales Group Geologists’ Association (LG)**

**January 10** (National Museum Cardiff): Holiday Geology

**January 24** (Cardiff): Gideon Mantell and Iguanodon: Wrong answers, right questions – Joe Cain

**February 28** (Swansea): Landslides in the UK: a climate proxy? – David Boon

**March 21** (Cardiff): AGM and Bob Owens (NMW): The DA Bassett memorial Lecture: From Welsh Geosyncline to Welsh Basin
Contact Lynda Garfield: secretary@swga.org.uk
www.swga.org.uk

**The Devonshire Association (Geology Section)**
Contact Jenny Bennett 01647 24033 Email: jenny.bennett@rocketmail.com
www.devonassoc.org.uk

**The Dinosaur Society**
Contact Prof Richard Moody: rjt.moody@virgin.net

**Dorset Group of the Geologists’ Association (LG)**
Contact Doreen Smith 01300 320811 Email: heldon47@btinternet.com
www.dorsetgeologistsassociation.com

**Dorset Natural History & Archaeological Society**
Contact Jenny Cripps: jenny@dorsetcountymuseum.org

**Earth Science Teachers Association**
Membership Mike Tukey 014804 57068
miketuke@btinternet.com
Details www.esta-uk.net

**East Herts Geology Club**
Contact Diana Perkins 01920 463755
Visitors most welcome - £2; Email: info@ehgc.org.uk
www.ehgc.org.uk

**East Midlands Geological Society**
**December 6** Members Evening followed by Cheese & Wine
www.emgs.org.uk

**Edinburgh Geological Society**
Email: secretary@edinburghgeolsoc.org
www.edinburghgeolsoc.org

**Essex Rock and Mineral Society (LG)**
**January 13** Santorini and the Dangers of Mediterranean Volcanoes – Ross Smith

**February 10** Geology and Archaeology of Crossrail – Christian Dodge

**February 21** Essex Gem & Mineral show 10-4 in North Romford Community Centre

**March 10** The Neanderthals – Prof Chris Stringer
Contact Ross Smith 01245 441201 Email: rossmith.rga@btinternet.com
www.ermso.org

**Farnham Geological Society (LG)**
Field Trip Contact Dr Graham Williams 01483 573802; Contact Judith Wilson Email: secretary@farnhamgeosoc.org.uk
www.farnhamgeosoc.org.uk

**Friends of the Sedgwick Museum, Cambridge**
Contact Dr Peter Friend 01223 333400
www.sedgwickmuseum.org/activities/friends.html
Coalfields Workshop – Alan Davies
January 16 Annual Dinner Venue TBA
January 30 AGM & talk on New Zealand or Japan – Peter del Strother
February 27 The geology of Islay and Jura – Lesley Collins
March 27 The Manchester Building Stones – Peter del Strother & Jennifer Rhodes
Secretary Jennifer Rhodes 01204 811203 Email: S_j_rhodes@hotmail.com
www.lancashire-geologists.co.uk

Leeds Geological Association
Visitors welcome. Details Judith Dawson 0113 2781060
www.leedsga.org.uk
Leicester Literary & Philosophical Society (Geology)
December 10 Christmas Meeting: New Walk Museum Leicester
January 12 Precambrian Fossils of Leicestershire and exceptional fossil preservation – Dr Phil Wilby
January 14 Early Phanerozoic Fossils and the radiation of major groups – Tom Harvey
February 11 Members evening
February 25 Dinosaurs – Dr Richard Butler
March 7 Annual Seminar
Contact Joanne Norris 0116 283 3127 Email: j.e.norris@ntlworld.com
www.charnia.org.uk
Liverpool Geological Society
Contact Joe Crossley 0151 426 1324 Email: lgsjoe.crossley@hotmail.com
www.liverpoolgeologicalsociety.org.uk
Manchester Geological Association
Minerals and Gems of the Cairngorms – Roy Starkey, The Russell Society
From Fluorite to Fluid Flow: an exploration of some iconic Northern Pennine Mines – Dr Brian Young, Honorary Research Fellow, University of Durham
The World Class Copper Deposits of Chile: Geology, Exploration and Discovery – Dr Chris Carlom, Mineral Industry Consultant
All meetings in the Williamson Building, University of Manchester
Contact Sue Plumb 0161 427 5835 Email: secretary@mangolessoc.org.uk
www.mangolessoc.org.uk

Mid Wales Geology Club
Contact Bill Bagley 01686 412679
www.midwalesgeology.org.uk
Mid Week Geology Club in Yorkshire
Contact mwgyorkshire@virginmedia.com
http://mwgyorkshire.webspace.virginmedia.com
Mole Valley Geological Society (LG)
8 January William Buckland: The First (Eccentric) Professor of Geology. Dr C Duffin. Natural History Museum, London
12 February The love life of Devonian fish Dr Zerina Johanson Natural History Museum, London
12 March Lucky Planet Dr David Waltham, Royal Holloway. Author of ‘Lucky Planet’
9 April Ground water: The good, the bad & the ugly. Natalya Ala, Atkins Global

25 April Field trip to Eastbourne chalk Professor Rory Mortimore University of Brighton
14 May Earth’s climate evolution: From Greenhouse to Icehouse. Dr Colin Summerhayes University of Cambridge
11 June Summer Soirée: Members’ Evening of mini-lectures with Pimm’s and chilled wine
20 June Field trip to Abingdon, Farringdon & Oxford University Museum Lead by Dr Graham Williams
11 July Field trip to Newlands Corner: The Clandon – Albury traverse Lead by Dr Diana Wrench
10 September The geology of North Devon Professor John Cosgrove, Imperial College
17-20 September Field trip to North Devon Leader: Professor John Cosgrove, Imperial College
8 October Annual General Meeting & Annual Dinner (N.B. 7.30 sharp start for dinner @ 8.30)
12 November The biggest volcano on Earth Dr Julie Pytulak, Imperial College
10 December Christmas Soirée: Members’ Evening of mini-lectures, mulled wine & mince pies.
Secretary r.s.leyel@btinternet.com
www.mwgs.org.uk

Newbury Geological Study Group
Field Meetings season runs from October to July. Normally meets on the third Sunday of the month.
Details Mike & Helen Weideli 01635 42190
www.nsgs.org.uk

Norfolk Mineral & Lapidary Society
Meetings at St Georges Church Hall, Churchfield Green, Norwich. 19.30hrs every first Tuesday of the Month except August.
Contact Colin Lansdell: clansdell@btinternet.com
http://norfolkminandlapiacs.homestead.com/

North Eastern Geological Society
Details Christine Burridge Email: negsec@gmail.com
www.northeast-geol soc.50megs.com

North Staffordshire Group of the Geologists’ Association (LG)
January 15 Dinosaur Embryos – Dr John Nudds
February 19 Sinking Cities – Dr Tony Waltham
March 12 AGM & Chair’s Address
Details Eileen Fraser 01260 271505
www.escl.keele.ac.uk/mgsa/

Open University Geological Society
Events listed on http://ougs.org, or contact secretary@ougs.org
The membership secretary is Phyllis Turkington e-mail: membership@ougs.org; tel: 0289 081 7470

Oxford Geology Group (LG)
March 7 Oxford Colloquium
Programme Secretary 07901 672713
www.oxgg.org.uk

Ravensbourne Geological Society (LG)
December 9 Xmas Competitions and Festivities
January 13 Kimmeridge Clay – Tim Ewin
February 10 Giving Building Stone a Voice – Barry Hunt
March 10 The Geology Collection at Horniman Museum – Paolo Viscardi
SPECIAL EVENTS

Manchester Geological Association
The Broadhurst Lectures: The Mineral World
Saturday 17 January 13:30
Minerals & gems of the Cairngorms - Ray Starkey,
The Russell Society
From Fluorite to Fluid flow; an explanation of some
iconic Northern Pennine Minerals - Dr Brian Young,
Honorary Research Fellow, University of Durham
The world class copper deposits of Chile; geology,
exploration & discovery - Dr Chris Carlon, Mineral
Industry consultant
Details above and at:
www.mangeolassoc.org.uk/indoormeetings.htm

The Essex Rock & Mineral Society
Essex Gem & Mineral show
Saturday 21 February 10-4
North Romford Community Centre
Details: www.erm.org/our-show.html

Oxford Geology Group
Oxford Colloquium
March 7th, 2015
Details: www.oxgg.org.uk

Manchester Geological Association
The Broadhurst Lectures: The Mineral World
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The Russell Society
From Fluorite to Fluid flow; an explanation of some
iconic Northern Pennine Minerals - Dr Brian Young,
Honorary Research Fellow, University of Durham
The world class copper deposits of Chile; geology,
exploration & discovery - Dr Chris Carlon, Mineral
Industry consultant
Details above and at:
www.mangeolassoc.org.uk/indoormeetings.htm

With the Festive Season approaching, this year we
have created a calendar from entries to the
Photographic Competition
to help you with your
Christmas shopping.

This will be available to
purchase at our GA talk on
5th December or through
the GA website
When I was 8 years old and living in Somerset developers began digging the foundations of a new housing estate just up the road. After penetrating the soil the JCBs hit a loose rubbly golden yellow rock full of fossils. I scrambled over the piles of rock collecting ammonites and trigonids. So taken was I that I pursued my interest to take Geology at University. And now over 40 years later here I am standing on a similar pile of oolitic limestone…

Having explored the Inferior Oolite with Professor John Cope and Bob Chandler the previous autumn we were able to take a closer look at it. But why "Inferior"? – we certainly didn’t think so. Turns out it was an accidental description by Townsend (1893) to distinguish it from William Smith’s Great Oolite, and the name stuck.

We started at Hive Beach near Burton Bradstock (Figure 1). The Bridport sands, deposited by a huge migrating sand bar, form the impressive cliffs. The biblical floods of the Winter had made them very unstable. Looking across the Lyme Bay we could see the impact of faulting in the underlying basement on the succession. Where was the source of the Bridport sands? – no one knows.

Eventually the high energy environment gave way to a shallower calm sea in which the Inferior Oolite limestone was laid down. The deposits show no cross-beding but considerable bioturbation in the form of Thallasonoides burrows. From time to time conditions changed so that the surface was planed smooth, leaving gaps in the succession. What was the cause of the planing – was it biological? Bob thought so. The gaps differ from location to location over very short distances, suggesting small movements of numerous faulted blocks like a mad game of Jenga.

The basal bed, the schissum bed, appears here, containing ammonites amongst echinoderm debris that show little wear and tear. Elsewhere perfect ammonites can be found amongst smashed up shell debris, possible evidence of occasional storms (Figure 2).

Bob described how his beloved ammonites could be used as markers because of their size and the rapidity of their evolution. This of course leaves plenty of room for debate about the boundaries of each zone. Here many of the Allenian ammonite zones are missing...
We travelled on to Uploders near Bridport, an inland location where good fossiliferous sections of the successions can be seen similar to that seen on the coast. Bob had got his JCB out to expose palaeo-surfaces. Some of us thought nature had done just as well and found excellent specimens coming to the surface in the nearby ploughed fields.

The section showed interesting lithologies, notably the Yellow Conglomerate which contained iron-rich ooliths thought to be biological structures. The thicknesses of the beds were much less than in exposures to the North. The section is topped by the wonderfully named Zigzag and Scroff beds marking the transition to the Bathonian stage. Our final stop for the day was a quarry on Waddon Hill. It is the site from which many type fossil specimens came and were published in the work of S. S. Buckman (1860-1929). It is situated 100m above Horn Park yet the same beds occur; more evidence for the existence of faulted blocks. Waddon is also the site of a Roman hill fort, which creates the potential for conflict between geologists and archaeologists (hand axes at dawn?). In fact fossils are most abundant within the boundaries of the fort. Bob had got his JCB out again and we had a wonderful time clambering over the spoil heaps, too busy to scan the beautiful scenery.

The following morning we made our way to Mapperton. This pit was once a small sheep-wash run and is interesting because it displays a sequence of rocks which cut out almost all of the Middle Inferior Oolite. The floor of the farmyard is the flat planed surface of the Scissum Bed with above it a unique exposure of zones, missing at Burton, containing well-preserved Leioceras. The Red Bed seen on the coast is absent and a thin remnant of the Discites Zone is directly overlain by Upper Inferior Oolite. The entire equivalent of the Horn Park Bed is no more than 4 cm thick but later Discites Zone rocks are preserved.

As well as ammonites we found beautiful solitary corals, sponges, gastropods and the occasional echinoderm test. The farmer is most helpful in putting to one side ammonites that emerge from his quarrying activities, so no need for back-breaking hammering! (Figure 3). The weather was turning nasty so Bob promised us a treat. After a short stop at a hostelry we turned up at a beautiful village with classic bubbling brook and ancient church. The stable of the manor house had been turned into a private museum by Bob’s friend Wolfgang Grulke. If you have to have an obsession in your semi-retirement then heteromorph ammonites seem to me a worthy one – see (Figure 4). The museum contained the most wonderful specimens collected from all over the world and displayed to full effect. We were awestruck and more than a little humbled.

Despite the competition from Wolfgang and others, the trip confirmed once again that talented amateurs can make a great contribution to our science. Thanks go once again to Bon and Geoff for a great weekend.

http://www.heteromorph.com/#/home
Field Meeting Report: Excursion to West Dorset

Leaders: Prof John Cope (National Museum of Wales)
Robert Chandler (Shirley High School, Croydon)

Photos: Martin Brown

This was the second meeting following the publication of Prof Cope’s revised GA Guide No 22, Geology of the Dorset Coast.

The danger of the cliffs at West Bay and the opportunity of a sunny weekend meant we were glad to spend the first day in the company of Bob Chandler. Anyone unfamiliar with his work and that of the Wessex Cephalopod Group would be well advised to read the report on the GA field trip to the Inferior Oolite of Dorset (this edition of the GAMagazine).

The excursion began with a trip to Upton Manor Farm at Uploders. Bob and John described the structural geology of the area – a series of faulted blocks affecting the sedimentation. The result is a highly variable succession from place to place, but principally comprising bioclastic oolitic limestone with exquisitely preserved fossils laid down in low energy conditions. This is exposed in a number of quarries in the area.

The first section of the day showed the classic succession. Here the yellow conglomerate is 2” thick and overlain by the red bed and the red conglomerate. At the top there is a planed off surface and bioturbation by Thalassinoides, an ancient arthropod, that goes through two ammonite zones, suggesting that they remained unconsolidated for some time. (Figure 1).

Bob has a favourite spot where, with the help of a JCB, a section and a whole surface area is exposed. Here we could see a slickenslided surface caused by the local faulting. The iron-shot ooliths, with high iron content, were very evident in the rock (Figure 2).

From Uploders the caravan proceeded to Mapperton, another favourite spot of Bob’s, in a what was once a sheep dip. Careless geologists can trip over ammonites here! We stood on the white schism bed, which exhibits the first examples of Mediterranean ammonites, and explored the Comptocostosum bed overlain with a thin bed of the Horn Park Ironshot, and then the Burton Limestone with big Parkonsonia. Here Bob has described a unique succession. It took little time to come up with small jewel-like ammonites.

After lunch we repaired to the Horn Park National Nature Reserve, a well protected SSSI showing a beautifully flat surface packed with ammonites quickly cemented in place and subsequently eroded through. Theories for its formation include erosion by an algal mat, a sort of reverse stromatolite, or changes in the chemistry of the sea-water.

The section shows the entire Aalenian succession and most of the Bajocian. Here the “red bed” is not red and has bioturbation but no fossils. Above this, the succession goes up through the Upper Inferior Oolite into the Zig-zag zone.

John told us the story of the quarry and the befuddling of the geophysical evidence by the number of faulted blocks that repeat the succession across the site.

At this point, Bob brought out his keys and opened what looked like a crude Egyptian Sarcophagus. Inside was just as fabulous; a cornucopia of ammonites featuring Brasilia aff. bradfordensis in both its microconch and macroconch forms. (Figure 3).

Bob left us - his work done. The afternoon being sunny we repaired to Hive Bay, ignoring the “yummy mummies” in the NT café and carefully approached the cliffs made famous in the series “Broadchurch”. At the top, a thin series of the inferior oolite overlays the Bridport sands with its notable hard and soft bands. The hard bands were cemented with calcium carbonate shortly after deposition, as proven by the flat mica plates incorporated in them. Contrast the mica in the soft bands is distorted by the flow of fluids through the unconsolidated sand. The yellow colour we were told is caused by oxidation of iron minerals on exposure to the air.

Evidence from ammonites proves that the deposit is “diachronous” across its outcrop; it is much older in Worcestershire than in Bridport and was probably created by...
a giant sand bar migrating south over time. Prof Cope showed us a beautiful example of cross bedding, with bioturbation.

We survived the cliffs and went East across a major fault with a throw of some 150m to where the Frome clay has been brought down to sea level, burying the Fuller’s earth. The contrast could not be greater. Here we have gray clay that has slumped onto the beach. Some fun was to be had collecting the Brachiopod Bouetti that marks the base of the Forest Marble.

The Sunday morning dawned sunny and bright. We convened at Seatown next to the Anchor Inn, sadly closed for refurbishment. From the harbour we could see along the coast talking in most of the middle part of the Lias group from the Upper Greensand and Gault of Golden Cap, through the Down Cliff Sands, Eype Clay and finally Green Ammonite Beds outcropping at Seatown. The shingle level was so high that the Belemnite Marls were hidden. John expressed his wish for some “really enormous winter storms”, which has subsequently been granted!

The Green Ammonite beds were highly contorted from periglacial movement during the Pleistocene. The search for nodules enclosing ammonites proved fruitless.

To the East, the Eype clay is brought down to sea level by a fault. Fallen blocks brought examples of the star fish bed, comprehensively raided by collectors with rock saws! Preservation of brittle stars is rare because the lack of connective tissue between the ossicles; they were buried alive in an ancient storm that dumped a metre of sand on top of them. They sit on the bottom of the blocks exposing their oral surfaces.

Figure 4: Prof Cope on the Eypemouth Limestone

Figure 3: Treasure of Horn Park

Rock falls brought us beautiful examples of the Junction Bed (previously the Beacon Limestone) and its sub-member the Eype-mouth limestone. This is a condensed deposit of 1m equivalent to 100m deposits at Whitby. It is coloured pink by Manganese deposits and exhibits fine banding caused by stromalites.

By now we were pretty hot and hence relieved to drive to a lookout above Abbotsbury to take in a fine view of Portland and Chesil beach. We learnt that contrary to expectations the beach is cemented and impermeable, creating behind it a brackish lagoon with a low tidal range. We could imagine the succession in the core of the Weymouth anticline from the features of the land, made complex by faulting and landslips.

After lunch we had a dose of industrial archaeology. Above the village of Abbotsbury are some degraded exposures of iron ore, mined at the time of the First World Wart, bounded by the Abbotsbury fault. This is contemporaneous with the Kimmeridge Clay. The deposit represents shoals of ooliths of iron silicate minerals. We liked the idea of grimy steam trains chugging up the beautiful valley in a vain attempt to make a profit.

Finally we came up the succession to Portisham to see huge blocks of Eocene silcretes; the famous Sarsens and puddlingstones. Once these locally cemented gravels, rich in volcanics from Icelandic volcanism, lay on top of the chalk from which they migrated down slope during freeze thaw activity in the Pleistocene.
Delegates from Belgium and France as well as the home country descended upon Burlington House, Piccadilly, for this meeting, devoted to the formation and archaeological uses of silcretes in general, and in particular of sarsens and puddingstone from the Anglo-Paris Basin.

Starting early, the conference was opened with a welcome from the Geological Society’s President, David Shilston, after which Brian Lovell, the senior proponent of the meeting, gave the opening address. This had a highly topical note, since it suggested that the formation of Hertfordshire Puddingstone concretions in the shoreline facies of the Upnor Formation coincided with the Palaeocene Eocene Thermal Maximum (PETM), a time of drastic environmental warming and resultant ecosystem damage that was linked to a massive injection of carbon di-oxide into the atmosphere, an analogue for the modern anthropogenic effect caused by unfettered fossil-fuel usage.

The morning’s proceedings included presentations on silcrete formation from researchers at Brighton University: by David Nash, who looked at different types of silcrete formation across the globe, and Stewart Ullyott, who discussed the interrelationship between the formation and occurrence of silcrete and Cenozoic landscape evolution in southern Britain. The main types of silcrete formation are by soil-forming (pedogenic) processes, at or near the palaeo-landsurface, and by other processes such as from silicicous groundwater, which can occur at greater depths. The latter group of processes seemed more likely to fit the range of evidence associated with the (admittedly enigmatic) sarsen and puddingstone occurrences with which this conference was mainly concerned. In between these contributions Jane Tubb (Open University) provided detail on the stratigraphy, distribution and palaeoenvironments in the most accessible area of puddingstone occurrence in present-day Hertfordshire, the Colliers End outlier, where a Romano-British puddingstone quarry has been discovered recently (Lovell & Tubb, 2006).

There followed a pair of presentations from Belgian silcrete researchers at the University of Mons: Christian Dupuis, who described the sarsen-equivalent silcrete quartzites of northern France and Belgium, linking their formation again to the PETM; Jean-Marc Baele, who reported on cathodoluminescence and electron probe micro-analysis of silcrete and puddingstone cements, this being a potential method for differentiating sources of quartzites and sandstones, as well as revealing evidence for cementation processes.

The final morning presentation was by co-convenor Jenny Huggett, who reported on recent petrographic and isotopic analyses of Hertfordshire Puddingstone. She pointed to the occurrence of very angular sand grains and flint shards in the matrix of some puddingstones. A surprising aspect of her data was the suggestion, from oxygen isotopes, of considerable warmth – perhaps too much for a purely climatic effect – being involved in the cementation of the puddingstone.

After Lunch Tony Brown outlined a periglacial (or de-periglacial – during the melting of frozen ground) mechanism for movement of sarsens from the sub-Palaeogene chalkland surface into valleys cut deeper into the geological column, such as the Axe valley in eastern Devon, in which sarsens occur within a diamicton largely comprising, in terms of gravel-sized and larger material, of Upper Greensand chert. Tony suggested that during the melting of permafrost the valley-edge worked backwards into the uplands by means of large-scale collapse, forming features previously attributed to spring sapping and depositing sarsens from the plateau amongst the ensuing ‘mess’.

Florence Quesnel then recounted the distribution of puddingstone and silcrete occurrences in France and discussed the evidence from these of relevance to palaeo-climate and landscape evolution.

After a final tea-break, the last pair of presentations were on archaeological themes. First Mike Parker Pearson described the distribution of sarsens, past and present, demonstrating that they were much more common before depletion by the kerbstone and building-stone industries of yesteryear. He discussed the tracing of the stones of Stonehenge to their source: bluestones (dolerites) to the Preseli Hills and sarsens to the Marlborough Downs, with fascinating hints of quarrying by the megalith makers in both cases. Then Chris Green homed in on the Hertfordshire Puddingstone and its single verified use (apart from in modern monuments, memorials and edging): Romano British querns (hand corn-grinding apparatuses). Knapped pieces of puddingstone, previously attributed by archaeologists to prehistoric tool-making, are thought by Chris more likely to be flakes removed during the quern-making process. This process involved boring holes in the puddingstone, a task beyond modern metal drills; this probably required the use of puddingstone debris as an abrasive, using the ‘diamond-cuts-diamond’ principle.

After an excellent day in Burlington House on the Friday aslightly different group assembled outside Bishop’s Stortford College on Saturday morning for the associated field meeting.
The boys and girls were in attendance (some of us remember Saturdays at school!) as the group was ushered by college staff through the buildings and into the internal grounds of Bishop's Stortford College, where a puddingstone block discovered during building work has been erected as a geological feature with explanatory plaque (Figure 2). This first example of the day was treated to considerable scrutiny, its many puzzling features the subjects of much discussion. Differences within and between examples of puddingstone became a theme of the day. This specimen was of particular value because it has been partly cut and polished, providing a valuable comparison with other naturally broken parts of the block and more weathered surfaces on this and, particularly, others seen later in the day. One immediately striking feature was the fractured nature of many of the flint pebbles, somewhat akin to the fire-crazing seen on flints from archaeological hearths, although here combined with the red-brown staining that is so characteristic of puddingstone.

After this excellent start the party went to Arkesden, where lunch was to be taken in a public house with, suitably enough, a block of puddingstone by the entrance to the car park. Before lunch interlocked blocks of sarsen, puddingstone and a half-and-half version (pebbly sarsen) were observed in the dry bed of the Wicken Water, which runs alongside the road through the village. These stones pre-date the modern road and are thought to represent the paving of a foot-ford (stepping stones). Cleaning of the stones for our visit had revealed a text-book pothole formed in one of the sarsens, suggesting that it has lain on this stream bed for a considerable time. After lunch the Puddingstone war memorial at Arkesden and sarsens beneath the church walls were inspected, before moving to the next locality, another puddingstone war memorial and church at Brent Pelham. Here a puddingstone quern was on display; the large slab of puddingstone forming the base of the Brent Pelham war memorial was notable for the dominance of ‘pea-shingle’, making it more like a pudding with sultanas than with plums. The puddingstone of the Arkesden war memorial includes a thin sand bed (sarsen). There was much discussion of possible way-up criteria in connection with this now vertical silcreted conglomerate]

The next locality was at Westland Green, where an entire concretion of puddingstone lies on its side by a fence. As well as its typical shape, the specimen is notable for a small zone that lacks matrix, thought to have been caused by seams of pea-shingle preventing finer-grained (post-depositional) matrix from penetrating between the pebbles. At the next site, Standon, another puddingstone monument stands proudly above a plaque – comparable to the Westland Green specimen but up on end – likened, too, to a Henry Moore sculpture. The plaque refers to glacial transport of the boulder to this location, which seems dubious at first, although subglacial processes would be one means of abraded the pebbles flat at what otherwise seems to be the original surface of the concretion (others have protruding pebbles).

The penultimate site visit was to a dry stream bed near Puckeridge, below the wooded hill in which is found the Romano-British puddingstone quarry for quern making (it was not possible to visit the quarry). The colluvial drift exposed in the stream sides included numerous blocks of variable puddingstone, as well as bullhead (glauconite-coated) flints and lesser treasures. Much of the puddingstone in this drift is likely to have come from the quarrying and industrial activities, as evidenced by the fresh and unnatural breakages displayed by many of the pieces found here.

Running late, the excursion omitted the planned visit to a sarsen erected at Standon Green End to commemorate a pioneering balloon journey, continuing instead to the final site – the impressive ‘puddingstone garden’ at a farm at High
Cross. These were saved for science by the private-enterprise geoconservation action of Mrs Bessie Parkins, who gave them a home when they were excavated in 2002 from the road cutting for the new A10 bypass road nearby. The numerous puddingstone blocks provided an excellent backdrop for a final discussion (led by Brian Lovell, Jane Tubb, Chris Green and Jenny Huggett), on the mechanisms for and timing of puddingstone formation, as well as other issues such as its environment of deposition. It was concluded that we do not have all the answers and there is plenty of mileage in further study of these enigmatic rocks in the future.

Before the party finally dispersed the Honorary Secretary of the GA, Diana Clements, gave a vote of thanks to the leaders for a perfectly splendid day in the Essex and Hertfordshire countryside.
Just a few steps up the road from the Post Office in Mistley High Street is a tall red-brick wall. Maybe over 150 years old, the wall has a section with lots of large cobble-sized stones. Mistley has plenty of local flints, but whatever these wall rocks are, many are not flints. They are stones from a long way away.

It doesn’t take much looking at the wall to realise that many of these cobbles seem to be ‘foreign’. To a geologist, these rocks are distinctly ‘Scandinavian’ in appearance. Along with the local flints, which are mostly knobbly grey showing black inside where they are broken, the cobbles include a whole range of rock-types, some of them quite striking – a museum-load of interest.

**Foreign Immigrants?**

The wall, which belongs to the long-established EDME Maltings, contains some big, rounded cobbles of gneiss, a garnet-studded schist, different colours of granite, hard sandstones, two types of porphyry (rocks studded with feldspar crystals) and a number of other eye-catching rocks. Most of these are igneous and metamorphic rocks which don’t occur anywhere in the bedrock of England.

The Baltic is an area of continental crust which contains ancient, hard rocks, many of which are of the types exhibited here in Mistley’s cobble wall. It’s a likely place for these rocks’ natural origin. If so, how did they get to Mistley?

**Distinctive Clue**

Very few rocks are so distinctive that a geologist can immediately suggest exactly where they came from. One of the most recognisable of all rocks to source in Europe is the Permian lava from around Larvik near Oslo, capital city of Norway. Here, each individual lava-flow rock layer contains feldspar crystals. Many of these are large, pale crystals shaped like the ace of diamonds (‘rhombs’). This distinctive rock, set with pale rhombs of feldspar, is called ‘rhombo porphyry’. There are at least six in Mistley’s wall!

**Brought by Glaciers?**

During the Ice Age, the North Sea was covered by thick ice sheets from Scotland and Scandinavia. Could the ice have brought the mystery Mistley cobbles? Yet these rounded cobbles must have been shaped by big waves rolling them about on a beach. Most rocks that were dumped by the ice are more angular. Overwhelmingly, East Anglia’s pebbles are of flint, derived from the Chalk hills. It would take a keen collector very many years to find this amount of large, ice-transported boulders along the flint-strewn fields and river shorelines around Mistley. Why should a collector bother to do this for a wall in Mistley High Street?

**Ships’ Ballast?**

Is it just a coincidence that the quayside on the river nearby is known as ‘Baltic Wharf’? Ships have traded there for years and a few still do; many were from Scandinavia and the Baltic Sea, carrying wood, fish, oil, ice. But all ships need ballast to make sure the ship is balanced and floats the right height out of the water: what was the easiest ballast to find and load? Cobbles off a handy beach.

**Oral Testimony**

I can’t imagine Mistley’s wall was so important that cobbles would be brought by ship specially to build this wall. Could it be that building this wall panel of cobblestones was a useful way of tidying up ballast, maybe when Mistley’s shipping trade dwindled? It might have been handy in this area which has little in the way of building stone for walling.

A retired seaman in Mistley told me that ships’ ballast was offloaded and piled up on quaysides so it was ready for re-use. The ballast may have been re-used several times and carried to different ports by boats. So this could be how Mistley’s foreign cobbles were brought, almost accidentally, by ship from the Baltic region. He also told me that there is a shoal called Ballast Hill in the Stour; indeed, this is named on the 1:50,000 scale O.S. Explorer map.

Could this ‘hill’ in the Stour be where ballast was offloaded until the demise of the sailing ships? Could Ballast Hill contain more porphyry and other exotic rocks like those in the cobble wall? It would be very interesting to sample it!
Following an enquiry to the Manningtree History Group, and a look through ships' registers in the Essex Record Office in Chelmsford, I learned that the Howard family were Mistley seamen, shipowners and importers through the nineteenth century and that they traded with Norway. A breakthrough came with written evidence of where exactly in Norway this trade was from.

An account written down in 1925 related a very old women’s memories of her grandparents’ story about an Englishman living at ‘Doebland’ (Doebla) by Hellesund. His name was Howard:

“According to what my aunt Amalie Pedersen (1844-1933) learnt from her grandparents, the house was built by Gundersen (Tor Gundersen 1768-1824) who was the first customs officer in Hellesund and he called the place the Widow Seat… Then the Englishman Havard (Howard) moves to Doebila, he was 1 of 8 or 10 siblings. According to what he told about himself he had been very poor. In his childhood he had to go fishing and then sell the fish before he could have anything to eat. After a while this must have improved and he was asked by his brother Jim Howard in England to travel to Norway and buy lobster, fish and other Norwegian products. He was unmarried and my aunt’s grandmother was his housekeeper… He bought lobster all the way from Sweden, salmon and wooden articles, Norwegian cranberries which were sent in water to England.” The account also related, “My aunt wanted me to know that he was her childhood love, a love that was reciprocated with many types of gifts… He lived there to 1847. He became ill and…

Figure 3: The picture shows a Rhomb porphyry lava from Norway, one of several examples in the historic Mistley wall

Figure 4: The Mistley cobble wall contains many other rocks characteristic of the Baltic area. This picture reveals that the mystery wall also contains rocks studded with garnets.

Figure 5: This picture shows a highly-compressed rock called ‘augen-gneiss’, with feldspar crystals like pale ‘eyes’ set in the rock

Figure 6: Cobble of Syenite?

Figure 7: Cobble of Quartz vein

Figure 8: Cobble with garnets

Figure 9: Mistley Baltic Wharf from Teahouse

Figure 10: Mistley Baltic Wharf from Teahouse
was taken to the town and died from pneumonia and was buried there."

Hellesund in southern Norway happens to be down the coast from the geological occurrence of rhomb porphyry lava. Countless boulders of lava would have been carried south along the coast to Hellesund by ice and rolled and smoothed by the waves on the beach for countless ages. Then, between the 1830s and 1860s, a highly-profitable import trade came from Hellesund to Mistley in Essex, the Howard’s home port. Lobster, fish oil and wood cargo required a good load of ballast to balance a boat. Baltic beach cobbles were ideal ballast, from the very region where these unique lava cobbles were likely to be picked up from the beaches of Hellesund.

In a photo album of old Mistley, the cobble wall is shown by a smithy: there was a longer section of the same style of wall with the same cobble filling just uphill, extending from the small remaining section that we can see and enjoy.

There are other walls with ballast content in the region, for example at Bawdsey Quay north side, along the road outside the Boathouse; and much of the walling of Wherstead Church. Guides refer to the church wall content merely as 'stone rubble' or similar. In fact the stonework of these walls includes some most remarkable examples of Baltic rocks; yet, in neither of these walls have I spotted a single specimen of rhomb porphyry, so distinctive in Mistley's Cobble Wall, which would be such a useful origin indicator. Incidentally, towns and cities along the eastern seabord of USA still have roads and walls containing British ballast stone from the days of the sailing ships: ballast was such a handy source of building material.

The 280 million year-old lavas of Larvik, Norway, with their distinctively-shaped crystals, have provided a rock-solid link between Mistley’s maritime past and the story of a surviving, historic wall. As a valuable display of geology as well as a maritime history lesson, the Mistley Cobble Wall is a real treasure of Mistley and of the Essex coast. It is listed by GeoEssex as a potential geoconservation site. It also has considerable local historical conservation value.

Thanks go to EDME Ltd. (English Diastatic Malt Extract Company) for permission to clean part of their wall and take photos; to Bob Horlock for much maritime information and pictures of old Mistley (including the Wall) in his photo albums, notably 'Visiting the Past', by Bob Horlock & Mike Fryer; to Peter Gant and the Manningtree History Group for key historic information, especially 'The History of Doebla' relating to the Howard family and trade with Norway; to Graham Ward of Essex Rock and Mineral Society and Gerald Lucy, GeoEssex, for alerting me to the wall’s content.

For excellent information and pictures of rhomb porphyry: see www.kristallin.de/

For information on development of the Wall area of Mistley High Street, with pictures of 'The Abbey' see www.callsarchitecture.co.uk/pages/projects/edme_mistley.html

Figure 11: Mistley, Hellesund and the origin of the rhomb porphyry lava cobbles. (Map data ©2014 Google)

Figure 12: An engraving by William Daniell of ‘Mistley near Harwich, Essex’. Published in 1822. (Tate Gallery Publications 1979 Ref. T02941 Photo: © Tate, London 2014)

Figure 13: The Mistley High Street cobble walls in front of 'The Abbey' (far right) in an old photo of the High Street smithy. (Bob Horlock, Mike Fryer)
We’ve had a really busy summer this year with more field trips than ever, the earlier ones being reported in the September magazine. Our late summer trips began with the annual residential visit to the Jurassic World Heritage Coast of Dorset and East Devon. The theme of Erosion was a great success and by the end of the week no one was left in any doubt about the many and varied impacts of erosion. Sadly, Barry Cullimore, the manager of Leeson House, was unable to join us after knee surgery, but we did manage to meet up with him and his crutches one lunchtime which delighted us all.

Our local geologists for the week, Richard Edmonds and Sam Scriven from the Jurassic Coast team and Alan Holiday, Chairman of DIGS, ensured we kept on track, worked hard and enjoyed the near perfect weather plus the occasional ice cream. After the succession of winter storms, there were plenty of examples of erosional features including a number of ancient ones that we explored illustrating our theme of Erosion and associated processes. It clearly hit the right note with the group as seen in the card they made and gave to me at the end of the week! We had a day at Branscombe investigating modern erosional structures and then a scramble up the Hooken landslide. This occurred in 1790 when the Chalk cliffs suddenly slipped and broke away as the underlying wet, slippery, Triassic clays shifted. We also spent some time exploring dinosaur footprints on Purbeck and then on to Swanage beach where examples of recent erosion in the low cliff sediments and the impact this had on the buildings on top of the cliffs superbly demonstrated how damaging erosion could be, economically, environmentally and in terms of human safety. Exploring Chesil Beach on Portland left us in no doubt about the destructive power and damage caused by winter storms. The level of the beach had been lowered dramatically, the promenade was still being repaired and huge diggers were shifting pebbles every day to try to restore the beach to its former glory.

A ‘first’ for Rockwatch was a day visit to Brookwood Cemetery with Di Smith. The cemetery, also known as the London Necropolis, is the largest in England and one of the largest in Europe. Originally it had a dedicated train line from Waterloo bringing the deceased to be buried here as land for burial became scarce in the capital. The variety of grave stones caused much interest and discussion and we plan to return with Di next year to complete our tour.

We had a very good weekend at the Charmouth Coast Heritage Centre with a mix of indoor and outdoor activities. Sliced ammonite polishing was high on the agenda the first morning and some fine samples appeared after much hard work! A film show to help orientate the children in geological time gave them much to think about, then after lunch a fossil collecting walk on the beach with Meirel and Phil. The children (and their parents!) found lots of beautiful pyritised ammonites and belemnites much to their delight and back at the Centre Phil and Meirel helped the children identify their finds. The following day we watched a splendid film on *Scelidosaurus*, Charmouth’s famous dinosaur then on with a very interesting microfossil activity which everyone really enjoyed. After lunch we were out on the beach but this time it was a public walk, so there were lots of other interested fossil collectors with us. Our Rockwatchers were by now quite experienced and did indeed, find lots of super ammonites, belemnites and fossil wood so no one went home empty handed!

We’ve had two public events recently both of which were highly successful and one primary school visit. The BGS Open Doors Day in Edinburgh and our very own GA Festival of Geology (FoG) in London which is reported more fully elsewhere in this magazine. The BGS event always attracts many visitors and we, on Rockwatch, are kept busy all day helping people to make fossil replicas; it’s always a hugely successful activity and I’m really grateful to Ann Harris (whose husband is a BGS staff member) for her uncomplaining help throughout the day. At the FoG we were very lucky this year to have lots of Rockwatch families helping. It always good when we have members to help as they are great ambassadors for the club.
The primary school visit in Essex proved extremely successful. The children loved handling the fossils. They were very curious about them, how they were formed and when they lived. They and their teachers were also intrigued by our ‘Geology in your Shopping Basket’ activity – a connection not made by any of them before our visit!

And, finally, I’m delighted to share the following with you: a short while ago, I was surprised to have a new book land on my desk, and even more surprised to see it was written by a former Rockwatcher and winner in a number of our annual competitions, James Barnet! Since graduating with a 1st class Masters degree in Geology, James has worked as a geologist in many parts of the world with an oil & gas consultancy. He has also written articles for this magazine and helped on the occasional field trip when in this country. He has just started a PhD: what a superb role model for our current members.


His book truly is the complete guide to walking in these glorious mountains. He begins with the geological evolution of Scotland and Great Britain and then details the geology of the Nevis and Mamore Ranges, around Fort William, zeroing in on Ben Nevis. This is followed by some useful data on local weather & climate, flora, fauna (especially the biting sort!) and equipment and advice for mountain walking. There’s a good section detailing the peaks with some excellent photographs and then the bulk of the book describes the walks. James has done all the walks himself, so is in a good position to know what to expect. For every route, he gives a short overview, a chart of physical data including grade of difficulty, a sketch map, an annotated altitude profile, masses of superb (often annotated) photographs and a full description of the routes with lots of fascinating information about the geology, flora and fauna and much else besides.

For those who love walking and exploring this is a marvellous book and should be in every visitor’s backpack to the area. It would make an excellent Christmas present for anyone thinking of a visit in the near future. Buy it now!

I conclude with a heartfelt ‘thank you’ to all those who give their time and expertise so willingly to help us ensure that our members have such a positive and interesting time during their Rockwatch membership. I wish you all a very happy Christmas and long life to this magazine and look forward to liaising with you next year.
...
some lifting their hands to the gods; but the greater part
convinced that there were no gods at all, and that the
final endless night of which we have heard had come upon
the world.” - Pliny the Younger

The bodies at Pompeii: an instructive insight of another culture, a horrific snapshot in history and a stunning portrayal of a fatal interaction between humans and geological processes. For anyone with an interest in these chance interactions, the events at Pompeii and Herculaneum are both intriguing and compelling. On a personal note, due to my fascination with ancient history and geology, I have always found myself drawn to this tale of frighteningly real tragedy and devastation. Here, I hope to learn more about the causes and effects of this volcanic eruption in 79 A.D, as well as the likely threat of similar events in our future, through examining the past and present of the culprit: Mount Vesuvius.

Situated in Southern Italy, the volcano looms ten miles from the modern city of Naples as it once would have dominated the skyline above the thriving Roman towns of Pompeii and Herculaneum. A composite volcano, Vesuvius was formed as a consequence of the collision of two tectonic plates, in this case the subduction of the African plate under the Eurasian plate. This led to the creation of a submerged volcano in the Bay of Naples, one of the volcanoes of the Campanian volcanic arc. Over time, Vesuvius slowly became a volcanic island out at sea, and due to the debris from eruptions it eventually became part of the mainland itself.

Nevertheless, the ancient Roman settlements within Vesuvius’ fertile vicinity were completely unaware that they were residing on the doorstep of a dozing killer. The volcano had erupted several times prior to that of 79 A.D, and three of those eruptions were undoubtedly larger than that which brought ruin to Pompeii. However, all eruptions were out of living Roman memory, and they imagined themselves to be living close to nothing more threatening than a mountain, whilst the warnings (such as frequent earthquakes) which we now recognise as danger signs, were accepted as inconvenient but unconscious features of their lives. The sudden eruption and the blanket of darkness which descended upon the cities would, therefore, have been completely unexpected, and the occupants of Pompeii and Herculaneum would have suddenly found themselves in a place of terror and desperation for which they were unprepared.

Vesuvius erupted at around midday on the 24th of August 79 A.D, ironically, the day after the Roman festival of Vulcanalia to honour Vulcan, their god of volcanoes. As an eyewitness, Pliny the Younger recorded the events whilst watching from the relative safety of Cape Misenum. He reported seeing ‘a cloud’ which was like ‘a pine tree, for it shot up to a great height in the form of a very tall trunk, which spread itself out at the top into a sort of branches; ….’ This account was not believed until 1980 when a similar eruption of Mount St. Helens, USA confirmed Pliny’s truthful account. The explosive nature of Plinian eruptions is caused by the composition of the magma within the volcano. In particular, the magma is relatively viscous and contains a high composition of gases (largely water vapour, carbon dioxide and sulphur dioxide). As the magma is forced up the magma conduit towards the surface, the gas bubbles, expands and eventually explodes smashing the magma into small pieces that we recognise as dust, ash and pumice. The explosive force of the eruption observed by Pliny was truly enormous with a rate of expulsion of 1.5m tons/second leading to a column reaching up to 33km in height. Across Pompeii and Herculaneum, darkness would have settled as if night had come early. The pumice raining from the sky was only about one centimetre in diameter, and there was no great risk of suffocating from the ash; the only real threat was the collapsing roofs and floors of buildings as they struggled to support the weight of the increasing pumice on top of them.

It was originally thought that the vast majority of people at Pompeii had suffocated. Furthermore, it was believed that the bodies at Pompeii could not have been killed by molten lava which, at temperatures reaching 1200°C, would not have preserved detailed human remains. However, this was clearly not the case for the people of Herculaneum, whose bodies were found reduced to skeletons with cracked skulls - evidently having been exposed to temperatures so high that their brains had boiled, and their skulls exploded. Yet there were no signs of lava at all. Recently, upon re-examination of the rocks themselves, a startling conclusion was reached: both groups of people had been victims to the same death, in the form of deadly pyroclastic currents racing towards the two ancient cities. These are caused when the weight of the volcanic material within the column becomes so heavy that it ultimately leads to a partial collapse, and a wave of super hot gas, rock, pumice and ash crashing down the side of a mountain at high speeds. The temperatures in these waves can reach up to 800°C and move at speeds of up to 300mph. Although powered in part by gravity, pyroclastic currents also undergo a process of fluidisation in which the movement takes on the characteristics of liquid so that it behaves like a giant, fast moving flood leaving a pathway of death and destruction.

This is exactly what happened during the catastrophic eruption of 79 A.D but, instead of just once, the calamity occurred six times. At 1am on the second day the first...
pyroclastic current surged towards the Roman cities, where the incredible heat killed every human within Herculaneum instantaneously, yet remained unknown to the people sheltering in Pompei. The wave ran out of energy, and never reached them. Despite this apparent good fortune, the column continued to weaken, becoming still more unstable. At 2am it collapsed again, and was shortly followed by a third pyroclastic current - each increasing in strength and drawing closer to Pompei. Around dawn, it may have seemed to the survivors that the worst was drawing to an end. The ash and debris falling was beginning to ease, and it is possible that some people returned to the city to collect their money and valuables as some of the dead were found alongside money, treasured charm bracelets, or other expensive items. It was then that the real tragedy struck Pompei. Sometime around 7.30am a fourth pyroclastic current was unleashed: the most powerful wave of gas and debris yet raced across the ground until it finally reached Pompei. The heat was powerful enough to effectively cook the people alive exceptionally quickly, but it was not great enough to reduce them to bones as the people of Herculaneum had been. Vesuvius’ eruption during this time had reduced two great cities of trade, culture and life to nothing more than broken ash-filled ruins. Out of the estimated 20,000 residents of Pompei, at least 2,000 have been discovered dead.

Since this time, Vesuvius has experienced around twenty-eight eruptions, with a more violent outcome expected around every two thousand years. Today, there are eighteen towns located around the base of Mount Vesuvius, and an estimated 3 million people would be in danger if Vesuvius were to erupt. Scientists have estimated that Vesuvius currently sits above 154 square miles of lava, and predict that the next eruption will most likely be a Plinian one of immense destruction. Many are hopeful that with the development of better technology those at risk could be alerted of the threat in advance, possibly having around twenty days in which to evacuate. Yet the frequent earthquakes in this area produce many false alarms, and it is still an immensely difficult task to ever try to predict the future. All that can be wished is that when Vesuvius next awakes from slumber the people of Naples are better prepared than those who previously dwelt nearby, in Pompei and Herculaneum.

Curry Fund Report

At our September Curry Fund meeting we received seven new applications. In addition to decisions on the new applications, we had to defer again a decision on an outstanding application from a previous meeting.

Of the new applications the following were offered grants: Earthlearningidea (ELI) a grant of £360 to cover the cost of webserver services for 3 years. The Centre for Research in Earth Sciences (CRES) University of Plymouth requested a grant of £288.30 to help defray the costs of producing programmes, posters and flyers for its postgraduate student conference. The group was offered a grant of £290.

The Lancashire Group of the GA incorporating GeoLancashire, applied for a grant of £1,620 towards to cost of developing a new website. After considerable discussion it was agreed to offer a grant of £1,500. It was decided to revisit the Guidelines for Applicants to make it clear that applicants (including this one) must demonstrate that they are capable of funding the hosting and maintenance costs of their site for at least 5 years since we do not offer support for these aspects. It was also suggested that consideration be given to restricting future grants for website design & development to a maximum of £1,500 in future.

Earth Science Ireland requested a grant of £5,722 towards the cost of producing a series of 4 Earth Science teaching plan resources for Northern Ireland primary schools. It was eventually agreed to offer a grant of £2,350 to cover the cost of printing the first of the four sections/booklets, for the rock kit housing and the DVD, subject to approval of the contents, which should include the text of all four booklets.

East Ilford Betterment Partnership was offered a grant of £2,000 towards the cost of installing a replica Mammoth skull as a permanent public display in Ilford town centre, a gift from the Natural History Museum London.

The application from Eric Portenga requesting a grant of £1,000 for air fare to the USA to present a paper and chair a meeting session was refused as was the application from HOGG for a grant of £500 towards the cost of producing an abstracts booklet for its meeting on Geology and Medicine.

A previous application from the Sperrins Gateway Landscape Partnership was deferred. The applicant had incorporated many of the comments the Committee had requested in the draft booklet, but was still of the view that the photographs are still too small, the text is still too long and font size too small, for a free, short, booklet for the general public. We requested further amendments before a final decision can be made.

Guidelines for applicants and application forms are on the GA website. We look forward to hearing from you.

curryfund@geologistsassociation.org.uk
The Geological Conservation Review (GCR) is a milestone in geo-conservation. The GCR identified sites, of national and international importance, that demonstrate the key elements of Earth History within Great Britain. The GCR forms the basis of statutory geo-conservation in Great Britain; a site must be a GCR site before it can be considered for protection as a Site of Special Scientific Interest (SSSI).

The scientific description of each GCR site is being published in a series of GCR volumes incorporating the insights and expertise of generations of leading geologists. Some 34 volumes were published by the Joint Nature Conservation Committee (web-site: http://jncc.defra.gov.uk/page-2731); many more were planned. In 2011 the Geologists’ Association took over publication of further volumes through Special issues of the Proceedings of the Geologists’ Association (PGA).

Essentially, each volume provides exceptional reviews of current knowledge, plus a series of geological site descriptions (extremely useful to assist field excursions). Three Special Issues have been published in the PGA and others are planned during the next few years. Also, it is intended that descriptions of any new GCR sites to emerge will be published in the PGA.

Electronic PDF files of chapters within the Special Issue GCR volumes are available via the PGA website; in addition hardback and softback copies of these Special issues can be purchased (on-line) from Elsevier our publication partner.

The following volumes are available for purchase in hardback or soft back.

- The Marine Devonian of Great Britain (PGA Volume 122, Issue 4, 2011)
- The Dalradian Rocks of Scotland (PGA Volume 124, Issues 1-2, 2013)

We expect to publish the following volumes during the next two years:

- Quaternary of East Anglia and the Midlands
- Quaternary of Southern England
- The Jurassic-Cretaceous Transition in Southern England

Further volumes are expected once these are completed.
Opinion Article: Mapping on the Isle of Wight

By: David A.G. Nowell

Luckily enough my comprehensive had a geology teacher, Mr Wilkins, who ran the school geology club in his spare time. Having been interested in space and astronomy before then at primary school, I took to the subject. Within a year I had joined the committee which, with some guidance, set out a timetable of lunchtime events and occasional Saturday field trips, plus working on our exhibits for the annual hobbies exhibition. In my third year a rival had his own entry in addition to the geology club’s expanding collection of practical experiments, and so I set out to find a suitable project for the next year, aged 14, when I came across a few pages at the back of a textbook about geology. This showed how you could set about mapping the eastern end of the Isle of Wight in England where the sediments are conveniently folded so that in a few km you can walk through the Cretaceous from the Wealden to the Chalk forming Culver Cliff, and then on the other side of Bembridge Down explore the varied Cenozoic sediments deposited on an unconformity following an extensive episode of erosion. By then I could already read a geological map as well as many sixthformers and use a compass clinometer to plot my location on a map and measure simple dips and strike directions. Given this, I asked my teacher for some advice, and following the instructions in another book made myself a mapping case out of two pieces of thin board glued into plastic table-cloth complete with a Velcro strip to close it up against the rain. Having persuaded my mother to find a cheap self-catering flat in Sandown for a week during the 1980 Easter holidays, all that I needed to do before our departure was for me to go and buy a copy of the local 1:10,000 map for £3.15. These days a similar site-centred plot would be prohibitively expensive and lack any contours.

Wandering around mapping

Having got the ferry to Ryde Pier we took the train with old London Underground carriages to Sandown. On my first day I wandered along the beach trying to read the rocks and identify the boundaries of the main formations, having read descriptions of the sequence beforehand. Plotting these locations proved tricky at first even with the aid of a council 1:25,000 footpaths map which showed Sandown Pier to help get my bearings on this gently curving bay: if you look closely at my final map you will see an error where I misallocated a band of sandstone within the Wealden. Soon I was recording basic dip measurements and, having inked up my earlier pencil work, on my second visit noticed my earlier error. During my walks over towards Whitecliff Bay with its classic sequence of near vertical Eocene clay-rich Reading beds, sandy London Clay and overlying Bagshot Beds (Bracklesham and Barton Group on the new BGS map), followed by more gently dipping Oligocene units towards the village of Bembridge and its intertidal rocky ledges, I varied my route to record any outcrops or features I could also observe. Given my bad spelling (due to undiagnosed ocular dyslexia hindering writing detailed field notes), once I had located the boundaries I was more interested in working my way westwards and mapping them along strike as some of them were very easy to follow. After a wet winter the contrast between the Chalk and the boggy ground of the Reading beds was obvious, and running parallel to this I was able to see changes between ploughed fields and inspect very low road cuttings, so that I was able to plot some of them with solid lines to denote greater certainty.

Brading and the River Yar

Towards the River Yar things began to become a little more uncertain when plotting the boundary of the chalk with the Reading Beds. Luckily for me there was a footpath northwards across a freshly ploughed field towards Colemans Copse which traversed this boundary. This clearly showed up in the soil, which changed noticeably over short distances. However, even after walking carefully along the western edge of this field next to the wood it was very hard to locate myself, and hence my use of dashed lines. Moving on I admired the distinctive outcrop of faded Upper Greensand at the T junction between Yaverland and Brading before discovering that a chalk quarry just before the bridge over the river was inaccessible. It may have been on another day that I looked around Brading and the downland above the village, including a number of disused chalk quarries, making a series of dip measurements and trying to plot boundaries.

Drawing up a geological map

Having not had time to cover the whole area covered by my base map, I travelled up to the geological museum in South Kensington, which still housed the geological survey library. While the staff were a little surprised by my youth they soon dealt with my request for the relevant six inch to the mile watercoloured 1:10,560 maps and sold me some thick tracing paper, so that I was left to get on with tracing them. Having done this, I was able to complete the remaining areas of my field slips, including dotting in the limits of the alluvial flats marked in light yellow, and found that, compared to the Victorian survey on the western side of the River Yar, I had located the upper boundary of the Chalk about 80 m further north. After drawing up a simple vertical section and key along with a horizontal section I very carefully water-coloured the complete map. At this point I presented my work to Brian Wilkins, my teacher, and suggested there might be a nearly
north-south fault in the river valley, given how my chalk outcrops did not match up and changed their dip by widening out. He pointed out that, given my difficulties locating this boundary position, ideally I needed to go back and find this boundary in the woods below this field. Ahead of the exhibition I built a 3D model at the same scale on a large board using polystyrene tiles to build up an exaggerated relief before covering them in plaster of Paris to produce a smooth profile, adding the boundaries without including this postulated fault, as on the day I intended to place a drinking straw to show its potential location. However, with only weeks to go the headmaster cancelled the annual event because senior teachers could not be bothered! Thus things might have remained, as within months I was taken seriously ill with an unknown fever and ended up in isolation hospital.

**Completing the jigsaw**

Though I got my core grade 1 CSEs and O-levels, A levels proved rather more difficult in poor health. Thankfully ILEA had not been broken up, as City and East London offered part-time Geology, while I did Physics at Southgate, and eventually was well enough to study for a year and get B and E grades. By this stage I had become a member of the Geologists’ Association and at the annual reunion discovered the Hertfordshire Geological Society exhibit. Having got to know Dr John Catt, he offered me support when I mentioned this earlier work, so it was worth going back to see if I could locate this problematic boundary in 1986 when I headed back to Brading to try and find it in Coleman’s Copse on a rather wet day. After managing to get there, I soon found the uppermost chalk beneath the roots of a tree, within a few metres of where I had located it six years before in the ploughed field above. Dr John Catt then typed up and helped me revise several drafts of my first short scientific paper (PGA, v.98, pp 187-190) in 1987, having had my figures professionally drawn at Rothamsted where he worked. Eventually I got to an interview at Liverpool University and after about five minutes having read round the subject was offered a place as a young mature student before I could even show Professor Tony Harris an offprint, which left him rather surprised as this is quite rare even for potential postgraduates. Still, having been rejected left right and centre, his instinct was right as having done physics options and the equivalent of A level maths in my first year, I was able to do Geophysics honours and gain a first, even if I still find remembering spellings and even equations rather tricky because of my poor visual memory.

**Wider pattern of faulting**

Later on I was able to find some time to visit the rest of the Isle of Wight and undertake fieldwork along the narrow near vertical chalk monoclines extending towards each end of the island and on the Isle of Purbeck, in Dorset, and find more examples at Shide near Newport and Freshwater Bay which I set out in a 1995 paper (PGA, v.106, pp 145-150). Then in 2000, discussing a paper about the buried channels in Poole and Christchurch Bays, coupled with this offshore evidence, I was able to explain concisely how this pattern of faulting allowed the island to become detached from the mainland (Journal of the Geological Society, v.157, pp.505-7). Indeed subjective, and all three of these faults are covered by superficial deposits. While it would have been the icing on the cake to have seen my faults included on this map, it is a stunning achievement at a time when the BGS is turning its cake to have seen my faults included on this map, it is a stunning achievement at a time when the BGS is turning its head to obstacles at one at Arish to Freshwater Bay and later shown on the Swanage sheet (342 east and part 343) published in 2000. At Brading, a 1:25,000 insert shows the upper boundary of the chalk somewhere halfway between the mapping and the previous survey. Furthermore, in a special issue devoted to the results of the BGS survey of the Isle of Wight in 2011, the overview paper by Peter Hopson (PGA, v.122, pp.745-763) stated that my faults had been “substantiated” on page 754. Also, without reference to my work, he mentioned that all three rivers on the island probably follow north-south faults to flow through gaps in the chalk ridges across the island, in the introduction to the very informative 2009 Quaternary Research Association field guide to the Solent Basin and west Sussex raised beaches.

**Last hurrah for BGS maps**

Still, delineating hidden faults can be a very fragile sandy soils within the New Forest National Park, while a new sheet could include offshore geology and properly contoured depths, as between Hurst Castle and Cliff End over 50 m of bedrock sediments have been scoured out by the powerful tidal stream exiting the Solent.
GA Festival of Geology Photographic Competition:

1st Prize: Little & Large; the Ilford Mammoth skull at the Natural History Museum: Gerald Lucy

2nd Prize: Multicoloured Eleanore Bay... Kaiser Franz Josef Fjord, Greenland: Gillian Sheail

3rd Prize: I flew extreme Iceland, they flew Death Wish Iceland!: Heidi Barnes
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For more information about:
- The Show: ermstheshow@hotmail.com
- The Society and a map: www.erms.org

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