FUTURE LECTURES
FESTIVAL OF GEOLOGY
WARM CLIMATE ONE DAY MEETING
WEALDEN TREBLE BILL
BOB STONELEY LECTURE
HANDS ON GEOLOGY IN E LONDON
BOOK REVIEWS
EARLY CHURCHES AND FOSSILS

CIRCULAR
JAPAN - A PLANNED FIELD TRIP
ALONG THE MIMRAM VALLEY
FIELD TRIP TO GERMANY
ROCKWATCH NEWS
RECENT DORSET RIGS ACTIVITIES
WHAT MADE THE SURREY HILLS
GEOLOGY OF LONDON GUIDE
The GEOLOGISTS’ ASSOCIATION does not accept any responsibility for views and opinions expressed by individual authors in this magazine.

The Geologists’ Association

The Association, founded in 1858, exists to foster the progress and diffusion of the science of geology, and to encourage research and the development of new methods. It holds meetings for the reading of papers and the delivery of lectures, organises museum demonstrations, publishes Proceedings and Guides, and conducts field meetings. Annual Subscriptions for 2011 are £40.00, Associates £30.00, Joint Members £58.00, Students £18.00.

For forms of Proposal for Membership and further information, apply to the Executive Secretary, The Geologists’ Association, Burlington House, Piccadilly, London W1J 0DU.

President: David Bridgland
Executive Secretary: Sarah Stafford

From the President

Now we are in the depths of winter it is perhaps a good time for ‘virtual geology’, rather than the real thing. Happily the GA now has a new and improved web site, which I can recommend to members. Your comments and suggestions for improvements would be most welcome. We are already working to get online payment added. I want to express our gratitude to Barbara Silva, who designed and set up the new site, and to Sarah Stafford, who was very busy getting it established and troubleshooting the change-over. Many will have noticed that there was an unpredicted hiatus between the availability of the old and the new, when we lacked an internet presence altogether; the timing was unfortunate, since it was just before the annual Festival of Geology (November 6th, at University College). Despite this the Festival was buzzing; I for one availed myself of several geological Christmas presents (some of them for myself). If you missed the festival this year, I encourage you to put the first weekend of November in your 2011 diaries.

I want to draw your attention to the plans for the 2011 Elsevier meeting. This will be entitled ‘Geoconservation for Science and Society: an Agenda for the 21st Century’ and will take place in early September (9th - 10th) in Worcester (subject to confirmation of our booking). It will be a two-day meeting: first an indoor session with oral presentations and posters, in which I hope all GA groups interested in Earth-science conservation will want to participate; then a one-day excursion visiting various types of geoconservation sites in the Welsh Borders and the West Midlands, with the Wren’s Nest NNR heading the list. We have opted for a Friday-Saturday meeting so as to placate both those who consider their weekends precious and those who can only participate at weekends. We also take the opportunity to run an important meeting outside London, something we know to be important to many members. Look out for more information about this meeting and please start thinking now about how your group can contribute!

David Bridgland

CONTENTS

3. The Association
4. Future Lectures
5. FESTIVAL OF GEOLOGY
6. Warm Climate - One Day Meeting
8. Wealden Treble Bill
9. Bob Stoneley Lecture
10. Hands on Geology in E London and Book Review
11. Early Churches and Fossils
13. CIRCULAR
17. Japan- a planned Field Trip
18. Along the Mimram Valley
19. Field Trip to Germany
25. Rockwatch News
26. Recent Dorset RIGS Activities
What made Surrey Hills
27. Geology of London Guide
Book Review

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Cover picture:
Irresponsible coring near the KT boundary, at Stevens Klint near Copenhagen, Denmark. Seen on the recent field trip.
THE ASSOCIATION

Report from Council

There is no council meeting in September but a report of the September one-day meeting on Climate Change can be found on page 6. At the October Council meeting Jonathan Larwood presented the latest state of the GA Photographic Archives (currently being conserved), which had been so well cared for by Margery Carpenter.

Jonathan started by showing us slides of some of the photos in the archives. He then described the conservation work. He explained that for each conservation box there was a record of the conservation work undertaken but not a catalogue of what was in the box.

Jonathan set out the next steps: long term repository; digitisation; cataloguing; using and expanding the archive.

He then made his recommendations: 1. Deposit the archive with the BGS - clarify ownership and future relationship; 2. Agree next steps - digitisation and cataloguing and exploring how this might involve GA membership; 3. Bring the archive to life - web access, new donations, involve GA members, exhibitions, new partnerships and publications (again potentially involving GA members); 4. Explore funding - Heritage Lottery Fund, 5. Consider National Collection status.

Discussion followed about the ownership of digitised images and access. Jonathan explained that this would all be agreed with BGS. He pointed out that whilst there would be no charge for storage there would be charges for digitisation and cataloguing if BGS did it. There was an opportunity to involve local groups in the digitisation and cataloguing. Mrs Susan Brown said she felt that the conservation work had been a good use of Curry Funds and Council agreed.

The Council unanimously agreed that the archive should go to the BGS and that the next stage was to talk with them about the collection and removal of the archive to BGS.

The one-day Elsevier funded conference on warm climates was well attended with 130 attending and the general feeling was that it was a well focused meeting. It is hoped that most of the speakers will contribute papers for a special edition of the Proceedings.

The President then talked about the 2011 meeting and it was agreed that early September was a good time.

The President reported that there had been problems with setting up the new website but these have now been overcome, thanks to the efforts of Sarah Stafford and that it is up and running.

Members are encouraged to look at the new website and let Sarah know of any problems.

Following a report from Paul Olver, the membership of Council charged with co-ordinating Local Groups activities, there was a general discussion and it was agreed that what was needed was a basic guide to geology in some form. One day events, lectures and field trips were mentioned as possible ways. Mrs Susan Brown wondered why the Council had withdrawn the taking of the Festival around the country. She felt that regional meetings could be an alternative, with potential funding from JAPEC funds and that these should be used to draw in the general public.

There was no November Council meeting, the meeting with Local Groups and Affiliates taking its place. A very fruitful and productive meeting was held with many mutual problems discussed. Delegates were encouraged to apply for grants for local research and local meetings.

John Crocker
General Secretary

Curry Fund Report

At the September meeting of the Curry Fund we had ten new applications, perhaps an indicator of the tough times everyone is facing in the search for grants. This is usually a fairly quiet month for applications, so it was a significant change. Additionally, the applications were for considerably larger grants than has been the norm in the past. The committee will be monitoring both these aspects to see whether this was a “one off” or the start of a new trend.

An application from Julian Ashbourne for £2000 towards the costs associated with his independent research project “Dinosaurs & Other Extinct Sauricians: A Historical Perspective”. The Museum of Jurassic Marine Life was awarded £375 for publication costs of “Life in the Jurassic Seas”, a catalogue of Steve Etches’ collection of Kimmeridge fossils. Gloucestershire Geology Trust was granted £300 for improving site access to Colehill Cottage Cutting, a RIGS with the only accessible exposure of Ordovician intrusives in the Southern Malverns. It is planned to write a geological trail to the site in due course. Sophie Beckett’s application for £3000 towards the cost of analysing igneous rocks found at an archaeological site in Norfolk, as part of the much bigger Sedgford Historical & Archaeological Research Project, was refused. £300 was granted to HOGG for publication costs of the abstract booklet for its forthcoming meeting on “History of Applied Geology” to be held in November at the Geological Society.

There were a number of decisions deferred until the December meeting, pending further information from the applicants, including from the Berkshire Geocconservation Group, The Dorset History Centre and Thomas Geron. A grant of £1000 was awarded to the Lyme Regis Fossil Festival 2011 towards the cost of developing its web site.

So, quite a mixed bag this time, which made for lively and interesting discussions. Our last meeting of 2010 will be in December and we look forward to receiving your applications.

Susan Brown
Curry Fund Secretary

Library Notes

Having read the Field Meeting Report in the PGA (v.121, p.342-349), members may be interested to know that we now have the latest general geological map of Tanzania: Geology and Mineral map of Tanzania, 1:2,000,000, 2008. Not detailed enough for local areas perhaps but good for an overview of the whole country.

Two French maps have been received as follows: Carte géologique de la France 1:250,000 de la marge continentale: Lorient, 2008 (includes both on- and offshore); and 1:50,000: Douarnenez, 1975 (map & text). Quite a number of British Geological Survey maps have been added to our collection. At 1:50,000 for England & Wales: 9 Rothbury (B&S); 39 Kendal (B); 76 Rochdale (B, B&S); 155 Coalville (B&S); 164 Llanidloes (B&S); 174 Thetford (B&S); 195 Lampeter (B&S); 203 Bedford (B&S); 210 Fishguard (B&S); 212 Llandovery (B&S); 311 Wellington (B&S). For Scotland: 16E Ettrick (B); 16W Moffat (B); 64W Newtonmore (B, B&S); and 108W Ben Hee. In the 1:25,000 geology series we have received the sheet Ardnamurchan Central Complex and also the 1:25,000 special sheet St George’s Channel (Bedrock with Tertiary subcrop).

Maps obtained on this summer’s field trip to Sachsen-Anhalt in Germany will be dealt with later.

Elaine Bimpson
Librarian
January Meeting

The billion dollar volcano - understanding volcanoes from source to surface

Dr Dougal Jerram
Department of Earth Sciences
Durham University

Friday 7 January 2011
Geological Society,
Burlington House,
Piccadilly, W1V 0JU
at 6.00 pm, tea at 5.30 pm.

As the dust settles from the recent volcanic crisis, this talk takes a brief look at just what happened during the recent volcanic activity, an event which brought volcanology to the coffee tables of the world. We look into taking volcanoes into 3D by using state of the art equipment to scan a bubbling lava lake, and discuss the role of volcanoes in our media. But what role do volcanic rocks have in our future? The topical exploration and production targets at the fringes and underneath the volcanic margins in the North Atlantic and beyond may have the answers. Volcanic margins forms the final focus of the presentation where ancient volcanic activity from the Iceland plume may hold the key to some new discoveries in possibly the final frontier of the UK key petroleum industry.

February Meeting


Clare Warren, Department of Earth and Environmental Sciences, The Open University

Friday 4 February 2011
Geological Society,
Burlington House,
Piccadilly, W1V 0JU
at 6.00 pm, tea at 5.30 pm.

High and ultra-high-pressure rocks, e.g. blueschists and eclogites, exposed in many Phanerozoic collisional orogens, are formed and exhumed during the later stages of ocean basin closure and the early stages of continental collision. The geodynamic processes and mechanisms driving their separation from the subducting slab and subsequent exhumation back to the surface are poorly understood. Numerical models provide insight into these processes and provide key constraints that can be tested against data from the geological record.

Continent-scale thermo-mechanical numerical models show that exhumation, like a small child running up a down-going escalator, is driven by the competition between down-channel shear forces (the escalator) and up-channel buoyancy forces (the child's effort at running uphill). Although buoyancy is the main driving force for exhumation, weakening of the subducted material plays a critical role in exhumation by first reducing the downward drag and then promoting upward flow of low-viscosity high pressure material. The models predict pressure-temperature-time paths which are consistent with natural examples.

March Meeting

What have trace fossils ever done for us?

Andrew Taylor, Ichron Limited.
andrew.taylor@ichron.com

Friday ?????March 2011
Geological Society,
Burlington House,
Piccadilly, W1V 0JU
at 6.00 pm, tea at 5.30 pm.

Fossil behaviour is a fascinating branch of the palaeontological tree. One of the clearest expressions of this comes from the study of trace fossils which are the impressions of life left behind in the sediments long after the producer has gone. This record includes the rasping, scraping, excavation and excretemental history of activity on or within an ancient sediment. When considering the origin of multi-cellular life, the first fossils we find are trace fossils, Vendian burrows that give a tantalising glimpse of the pioneering sea bed communities. At the other end of the timescale, today burrow-fills and mountainous piles of animal droppings have huge economical value as they contain hydrocarbons or act as aquifers. This relationship between what animals do in the sediment and how this affects our ability to extract oil and gas will be illustrated. The net gain to mankind can then be calculated and we can fairly consider what trace fossils have ever done for us.
Once again the Festival was a great success. There was a general 'buzz' in the air with crowds of members and visitors admiring the stands of the Local Groups, from all over the country, showing their range of activities, their finds, over the year all excellently displayed. The GA photographic archive was on show as usual, but can now be viewed more readily without damage, thanks to the efforts of Richard Weedon, and Jonathan Larwood and a grant from the Curry Fund.

The Festival of Geology grew from the Geologists' Association Reunion into a two-day public event in 2006. The decision to "go public" was a happy one: and adding a lecture series proved to be a winner. The 150 seater lecture theatre was packed for this year's lectures, given by Bryan Lovell (Challenged by Carbon: The Oil Industry and Climate Change), Chris Carlon (Mining the Ocean - Diamonds and Gold from the Sea Floor), Pete Grindrod (Exploring New Water Sources on Mars) and Charlie Underwood (Whale meat again: Return to the Whale-eating Sharks and Shark-eating Whales of the Egyptian Desert). Of note this year was the increased numbers of late teens/early twenties, a group we would like to attract to the GA and its activities.

The addition of field trips on the following today to the Upper Cretaceous of Surrey, the Riddlesdown Chalk Quarry and the building stones of the British Library also proved to be very popular. The new GA Field Guide on the Geology of London proved to be a winner with all the 100 copies brought to the Festival being sold and orders taken for future delivery.

Mineral stalls reported a successful Festival and Buffy's Beads still had a queue when the festival was starting to close at 4.30. The stall on Colour in Minerals proved popular again, with one young visitor looking through a binocular microscope at every single specimen: all eighty seven of them.

In the Discovery Room Rockwatch held their usual excellent range of activities for the young. One young man brought a small group of friends to celebrate his eighth birthday at the Festival. Rockwatch's racing trilobites are always a draw for smaller visitors, and making dioramas are a perennial favourite. The Kent group's microscopes are popular with budding palaeontologists, and UCL Museums and Collections provided zoological, archaeological and geological handling materials.

UCL opened their Centre for Planetary Sciences and Rock Room in Earth Sciences. The photographic competition itself had some excellent contributors, and attracted more entries than ever. The winners for this year can be seen on the back cover.

Thanks to all the people who supported the event on the day by coming to visit, exhibit, run an activity, give a lecture or lead a field trip; a special mention also to members of the GA, and to staff and students from UCL (Earth Sciences, UCL Museums and Collections, Estates and Facilities) who contributed behind the scenes.
The meeting was introduced by Dr Danielle Schreve, our immediate Past President, who said that it was the first of a series of one-day annual science meetings of the Association that had become possible because of the sponsorship by Elsevier, part of our new five-year publishing contract. She was also very pleased to welcome colleagues from the Department of Energy and Climate Change, who had sponsored the meeting. The theme of the meeting was a review of key periods of climate change leading to higher-than-average (modern) global temperature as revealed by a study of past fauna, flora, stable isotope ratios and other factors throughout geological history; with particular emphasis on the important drivers that led to changes in sea level, ice cover and vegetation.

In presenting the first paper, Professor Mike Benton (Bristol) reviewed the evidence for life moving onto land and the effects that this had produced on the global climate. Simple land dwelling organisms may have evolved in the Precambrian but terrestrial ecosystems did not become more complex until the Silurian and Devonian when land plants became tree-sized and provided an expanded array of ecological niches for animal life. Devonian and Carboniferous life was focussed around the equator where the vast damp tropical forests provided an ideal environment for early tetrapods. This came to an abrupt end in the Late Carboniferous and Early Permian with the collapse of the coal forests and the expansion of the southern icerack that limited life on land as species had to adapt to a more arid environment.

In the Late Permian, after the icecap melted, life on land once again flourished until the end-Permian mass extinction that could be linked to the global atmospheric changes caused by the massive volcanism of the Siberian traps and the dry conditions brought about by the development of Pangea. Finally the further interplay between humid and arid conditions in the Triassic may have played a key role in the evolution of the dinosaurs.

Moving forwards, Dr Gregory Price (Plymouth) evaluated the role of CO$_2$ as a primary driver of Mesozoic climate change. There was a general consensus that high levels of atmospheric CO$_2$ led to an increase in global temperatures. However, there were some anomalies in the Mesozoic particularly from sites in high latitudes where the reverse appeared to be true. Dr Price had looked at these areas in detail and could confirm that there were certainly periods of very rapid global cooling as shown by the analysis of belemnites; the presence of glendonite pseudomorphs after ikaitae; and the presence of erratic pebbles in finer grained sediments that could be interpreted as drop stones due to ice action. Careful examination of sections at two sites in Siberia and one in Svalbard, however, had shown that such cooling events were very short-lived and in no way contradicted the broad hypothesis of increasing temperatures with higher CO$_2$.

He also drew attention to the problems that had arisen from a palaeotemperature curve for the Phanerozoic that appeared to show a period of cooling in the Jurassic. Close inspection of the data revealed that the curve was based on isotope measurements from three groups of organisms, with brachiopods being used in the Palaeozoic, belemnites in the Mesozoic and foraminifera in the Tertiary. It appeared that results from these different groups were not strictly comparable and a new curve based on Mesozoic brachiopod evidence showed no signs of overall cooling.

In her review of land biotas of Palaeogene warm climates (c. 65 - 34 Ma), Professor Margaret Collinson (Royal Holloway) said that the period was characterised by a series of hyperthermal events within an overall warm climate until it was terminated by a transition from greenhouse to icehouse conditions at the Eocene-Oligocene boundary. Four important events could be recognised. These were a short-lived rapid onset Palaeocene-Eocene Thermal Maximum (PETM); a much more prolonged Early Eocene Climatic Optimum (EECO), an 800 ka "Azolla" event near the end of the EECO and a rapid fall in temperature at the Eocene-Oligocene Transition (EOT).

Reviewing the evidence for these events, Professor Collinson said there was a clear indication of the northward migration of plant species in the northern hemisphere during the PETM, which affected the mammalian and insect fauna. Some of these effects could be seen in detail. For example there was evidence that high concentrations of CO$_2$ had resulted in a reduction in the proportion of nitrogen in the atmosphere that had affected plant chemistry. This in turn had affected the insect population and the increased amount of damage seen on fossil leaves could be interpreted as being due to insects consuming more plant material in their diet. There was also evidence of a major shift in fire regimes.

The much more prolonged EECO showed good evidence that mangrove and paratropical forests had existed in mid-latitudes in Europe with many ancient relatives of species now found in the tropical zones of Central America and Africa being found in the European fossil record - for example in the London Clay - giving rise to an increase in fructivores in the mammalian record. The "Azolla" event was characteristic of Arctic and Nordic seas and had extended as far south as Denmark where blooms of the freshwater floating fern Azolla showed good evidence of warm wet climates in high latitudes. Finally there was evidence of cooling towards the end of the Eocene as the paratropical forests of the EECO were replaced by subtropical and then temperate regimes, a change that was reflected in the evolution of the dentition of ungulate mammals that showed a clear trend towards a more abrasive diet as fruit became less plentiful and individuals were forced to graze on leaves.

In presenting the first paper after lunch on the lessons that could be learned from the last interval of greater global warmth in the mid-Pliocene, Dr Alan Haywood (Leeds) said his first problem was one of terminology because of the current discussion over the Plio-Pleistocene boundary. This was most unhelpful to a non-geologist and he urged the stratigraphical community to come up with a solution so we could all use the same nomenclature. To avoid confusion, his Mid-Pliocene Warm Period (MPWP) took place between ~3.3 and 3.0 Ma BP and was the last time when global mean temperatures were higher than the present day over a prolonged period, caused at least in part by higher than pre-industrial levels of CO$_2$. The period provided an accessible example of the sort of world that might develop in the 21st century and provided excellent data for climatic modelling. These could be run with different starting criteria such as the value of
surface and deep ocean temperatures, the nature of the vegetation on land and the presence or absence of tundra. The results of modelling could then be compared with the actual evidence from the geological record for this period. For example, the observed changes in the Greenland and East Antarctic Ice Sheets, providing a test for the assumptions used in the model. Dr Haywood stressed that this method did not provide a predictive model for current conditions. However, it did establish the validity of the modelling process and provided climate scientists with clues as to the sensitivity of the modelling process and how the global models could be improved.

Dr Ian Candy (Royal Holloway) next provided us with an account of warm climates during the last 1 Ma as exemplified by the various interglacial episodes. We were now into a period where there were long continuous records of global climate from ice and marine cores that provided the necessary isotopic evidence to establish global temperatures. These could be supplemented by the geological information of the fauna and flora present in interglacial deposits giving good control over the use of climate proxies. It had been found that over the last 450 ka BP, the fauna and flora from interglacial periods indicate that conditions were at least as warm, and in some cases warmer, than today. However, in the period 800 - 450 ka BP such records showed that many were somewhat cooler. This is in contrast to the evidence from ice cores in particular.

At present there is no explanation for this step-like change but it corresponds with an increase in greenhouse gas concentrations observed in trapped air bubbles in ice cores. British records are very important in highlighting this disparity, however, and reconstructions of the known interglacial periods over the 800 - 450 ka period were characterised by some of the warmest conditions known during the Quaternary. The whole process was driven by Milankovitch cycles but these in themselves were not sufficient to explain the wide variations in temperature. Dr Candy stressed there had to be a reinforcing effect due to feedback mechanisms, for example the reduced albedo caused by the loss of ice cover; the influence of changes in vegetation; and the possible release of greenhouse gases in the form of CO₂ and CH₄ hydrates. These were all very relevant to the position we found ourselves in today.

In the final paper, Professor Paul Valdes (Bristol) gave an account of his experience as a climate modeller using data from the Eemian (~130 - 115 ka BP, the Last Interglacial) as an example. The Eemian interglacial was the last period when global temperatures were warmer than today and it also represented a time period where the data coverage and accuracy were exceptional, providing a good control for the modelling process. Taking this as a starting point it was possible to produce predictive models for future climatic changes that gave a range for the increase in average global temperatures of between 1.5 and 6.0 °C by 2100. To put these in perspective, mankind could probably adapt to an increase of 1.5 °C, but a level of 2 °C was considered by the EU to be “dangerous”, whilst 6 °C would see global temperatures rise to levels not seen since the Cretaceous and a return to a time where there was no ice cover on the planet. Professor Valdes stressed that these models currently produced a considerable degree of uncertainty and the “perfect” climate model simply did not exist. It was important not to overstate things and there was a great need to test the processes used in the models and increase their sensitivity. This could only be done by continuing to improve the raw data from geological observations and by a further increase in computing power so that models could be run with a higher spatial resolution so that effects such as cloud cover and hydrological changes could be added to the modelling process.

Overall the meeting showed that there was good if somewhat complex evidence for the nature of warm periods of global climate in the geological past and these provided a basis for understanding the current changes that are taking place. Our job now as geologists is to place this information before the general public in a form that they can understand so that the correct political decisions are made with regard to the future of mankind on our planet. In particular there is a need to bridge the gap between the highly regarded but complex peer reviewed scientific papers that are available to specialists and the sensationalist treatment given to the subject by the popular press. Hopefully, with the help of Elsevier and the DECC, this meeting of the GA will have contributed to that process.

Dave Greenwood

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**Nominations needed for:**

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

**New Members of Council**, to be elected in May 2011

Nominations needed by January 31 2011

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**Why not give a GA membership to a friend for Christmas?**
Wealden treble bill 2010: Smokejacks, Warnham and Keymer

Thirteen members and guests assembled at 10.30 on 10th July at Smokejacks Brickworks on a hot sunny day. The pit had not been dug for 2½ years due to the recession and the floor was completely flooded. Erosion gulleys created by rain run-off revealed fossiliferous yellow siltstones and brown ironstones. Finds in the siltstones included fine charcoal and clam shrimps (conchostracans/spinicaudates). Sideritic ironstones yielded beetle elytra including nearly smooth and ornate forms (Fig. 1) and cockroach wings, plant leaflets, snail ‘lids’ (operculae), and fish teeth and bones. The weathered mudstones also produced a cockroach showing a thorax and base of folded hindwings (Fig. 2). Specimens in figures 1 and 2 were found by Biddy Jarzembowski (BJ). An unusual unguis, similar to Rhizocorallium was found by Mary Bite. In the afternoon, the party drove to Langhurstwood Quarry. This is being actively dug and the bottom was nearly dry. A sandstone in Styles’ bed 19 (near the top of the section) was full of mica flakes glistening in the sunlight and yielded a fern to Richard Agar, possibly Onychiopsis, buried at 90 degrees to the bedding. Geoff Swann suggested a possible Devonian origin for the mica. Insects were found with some charcoal specks in grey siltstones near the middle of the section (bed 13?) including a polyphagan beetle and colour-patterned elytron found by BJ (Fig. 3) plus wings of true flies, leafhoppers, a cockroach and a true bug. Fish remains also turned up including a fine compact heteropolar spiral coprolite (Fig. 4) found by Terry Wakeman. This could very well be the internal cast of the spiral intestinal valve of a Wealden shark. Shells of Unio were also found.

The Wealden treble bill continued with a subsequent trip to Keymer Tileworks, Burgess Hill. 45 members and guests from the Natural History Museum assembled in the car park at 10.00 on 7th August. The weather was mild but cloudy with light showers later in the day. After a brief introduction by EJ, the party proceeded into the pit which lies below British Geological Survey Bed 3a. The section had changed somewhat since the last GA visit in 1998 (Jarzembowski & Radley, 2001). The southern working was mainly overgrown and flooded, but a sustained search yielded a few sideritic concretions with conchostracans, wood fragments, beetle elytra and a cockroach tegmen; also found was a mudcracked ripple-marked sandstone (BGS Bed 3: see logs 2,3 of Cook & Ross, 1996). The northern working, however, had been extended down by c. 9 m below the white band marking the vertebrate horizon noted 12 years earlier. The white and subjacent green clay were well exposed (Fig. 5) yielding numerous fish bones and teeth (Lepidotes, Lissodus), turtle bones and small crocodile scutes. Bulk samples were collected for sieving. The newly exposed grey clay below included at least two siltstone horizons with horse-tail (Equisetum/Equisetites) stems and also numerous tubers. One specimen showed a rhizome attached to an empty tuber cavity. The upper siltstone horizon also showed a few mudcracks. Splitting the siltstones yielded only a few fossils including teleost scales, a Coelichinus trace, beetle elytra and comminuted plant and conchostracan debris. Recent rain had washed the siltstones revealing fine sole structures including trace fossils of which the largest were Beaconites burrows - also seen in a soft, buff sandstone noted in 1998 - but the whole section was now deeper than Cook & Ross’ adjacent log 1. More work is needed especially as the site is scheduled for housing development. Our thanks to Wienerberger and Nell Tobin for permission to visit the pits.

Note: On a follow up visit to Langhurstwood Quarry on the 29th August a fresh scrape in the main pit had disturbed a thin band of limestone covered in a fine to medium sand (sand grain size 100-500µm, mainly quartz) just below the Paludina Limestone which marks the top of BGS Bed 2a. Closer inspection of this thin limestone revealed numerous (100+) scattered otoliths, thus establishing the stratigraphical position of at least one otolith-bearing horizon.

Ed Jarzembowski
Peter Austen, Geoff Toye and Claire Mellish

References

The First Bob Stoneley Memorial Lecture.
The habitat of petroleum in the Wessex Basin
by Professor Dick Selley.

In his introductory remarks, the President, Dr David Bridgland said it was a great honour to be able to chair the first Bob Stoneley Memorial Lecture and to be able to do so in the presence of some of Bob's family. He also announced that the meeting had been sponsored by the Petroleum Exploration Society of Great Britain (PESGB) and that the Geological Society of London had waived their normal fee for room hire. Dr Bridgland had not known Bob well so invited Professor Susan Brown to add her comments.

Susan Brown said that she had worked with Bob in the 1990s when he had been General Secretary (1993-98) and later during her time as President (2000-02) when he had been awarded the Halstead Medal. Bob had been a member from 1957 until he died in 2008 and had led a varied and interesting life which we would hear about later. However, there was one important event that she wished to place on record and that was Bob's connection with the Joint Association for Petroleum Exploration Courses. JAPEC had been set up in 1980 during a period of rapid development in North Sea oil and, although it was run as a charity, it had accumulated a considerable financial surplus that could only be passed on to a similar organisation. Some of this was donated to the GA* to support regional meetings and most appropriately Rockwatch. Professor Brown recalled that Bob had been a good host and remembered many enjoyable dinners in London entertaining visiting speakers after which Bob would depart (somewhat unsteadily) for Kensington on his bicycle.

In beginning his talk, Professor Dick Selley said that he would divide it into two parts. Firstly he wanted to say something about Bob as a man and then he would look at Bob's contribution to geology. Bob came from a scientific background (his father, Dr Robert Stoneley FRS, was a distinguished mathematician and geophysicist who had discovered the eponymous "Stoneley Wave"). Bob had followed his father to Cambridge where he graduated in 1951 after which he went to the Antarctic with the Falkland Islands Dependencies Survey (FIDS). Full details of his career are described in his obituary (PCA 120 (2009) 93-96) but it should be noted here that Bob received the Silver Polar Medal awarded for "extreme human endeavour" during his time with FIDS.

After returning to the UK and completing his PhD, Bob joined BP as a geologist in 1953 and spent the next 26 years in many often remote locations ending in Iran where he was Chief Geologist of the BP Oil Service. Following that he took up the Chair of Petroleum Geology at Imperial College, London, in 1979. There was no shortage of students but problems arose in funding, due to the fact that Government money was being directed towards Petroleum Engineering, and in retaining staff who were lured away by the financial attractions of working in the North Sea. Bob overcame these difficulties and developed the established well-regarded MSc course in Petroleum Geology and was instrumental in the formation of JAPEC. He had operated an "ever open door" policy with his students and the regular Dorset field trips had become legendary. When it came to publication, Bob was a member of the old school who considered that producing too many papers was rather vulgar, but those that he did produce were always well worth reading. He received many awards but perhaps his most fitting epitaph was to be remembered by an Antarctic Weather Station that took its name from Stoneley Point on Whiskey Bay.

Turning to Bob's academic work, Professor Selley said there were five requirements for the production of petroleum. These were: 1) a source rock that contained organic carbon; 2) a permeable reservoir; 3) an impermeable seal; 4) a suitable structural trap; and 5) a geothermal history that had allowed temperatures to reach 60-160 °C (oil) or 160-240 °C (gas). All five could be found in the Wessex Basin where the Lias, Kimmeridge and Oxford Clay provided the source; the Triassic Sherwood Sandstone and Jurassic Bridport Sands and Cornbrash the reservoirs; and the Mercia Mudstones and various Jurassic clays the seals. In the Wessex Basin, only the Lias Clays had been at sufficient depth to have been "cooked" and they were the source of oil in the area. However, the Kimmeridge Clay was of great importance in the North Sea where it was the major source rock. All these formations were well exposed on the Devon and Dorset coasts, providing a superb area for teaching the fundamentals of petroleum geology.

The structural history of the area began in the Palaeozoic when large scale deep-seated northwesterly facing Variscan thrusts had been formed. These had been reactivated in the Mesozoic during a period of crustal extension that resulted in a reversal of movement along them that contributed to the development of deep sedimentary basins. This came to an end with the Alpine earth movements that reintroduced a compressive regime and resulted in reactivation with movement again towards the northwest. At the same time the beds had been folded into complex monoclines (as exemplified by the Lulworth Crumple) and these structures gave ideal conditions for the migration and accumulation of oil, well illustrated by BP's Wytch Farm oil field near Poole, which was the largest onshore oil field in Europe. There were many local complications, all of which were admirably described in the various papers and field guides to which Bob had contributed during his career. As has often been said, all this was worked out by Bob with little more than a hammer, pencil, paper and the little grey cells!

* Noted in the GA Annual Report for 2001 (p 4) as amounting to £50,000.

Dave Greenwood
Book Review

"The Story of Iron Ore Mining in West Cumbria" by Mervyn Dodd with a contribution by Maureen Fisher. Edited by Susan Beale. 82pp. Price £7.50 plus £1.00 p&p.
Available from Anne Freeland, Pasture Lane Farm, Pasture Lane, Hesket Newmarket, Wigton, Cumbria CA7 8JP and from booksellers nationwide.

With the loss of once vital industries and the passing of those who worked in them, this book is a timely reminder of the importance, in this instance, of iron ore mining in west Cumbria. Mervyn Dodd’s book brings to life the history of this industry in this part of the country, with its inherent dangers to the miners, the hardships to their families and its great wealth to the mine owners.

He begins with the geological setting of West Cumbria, blessed with high quality haematite deposits and mostly located within the 350myr-old Carboniferous limestone. These haematite deposits are very rich in iron, some 50% by weight, with a low phosphorus content. Iron ore mining in West Cumberland began before 1200 AD, peaked sometime in the mid to late 1800s with the demands of the industrial revolution, especially after the introduction of the Bessemer process in 1856 and ended in March 2008, as the reserves were almost exhausted. The rise and fall of the industry is well recorded, as are the dangers to those working in the mines. Donald cites many examples of men dying of horrific accidents in the mines and of the lingering illness (pneumoconiosis) suffered by many, long after they ceased working in the industry.

Dodd charts the development of many of the small towns and villages in the area as the mines were opened and homes were needed for the miners. The areas of Lampugh, Kirkland, Frizington, Cleator Moor and Egremont merit chapters highlighting their growth during the height of demand for iron ore. The industry’s decline in Cumberland began in earnest during the early 20th century as cheaper, lower quality ore, from the East Midlands and Spain flooded onto the English market. High costs as well as declining reserves and the coal strike of 1921 hastened the decline. And, of course, with the industry’s decline came high unemployment and its associated social problems.

With the decline of the industry came changes to the surrounding countryside, changes which still occur, as old mine shafts and worked out veins continue to collapse. There are some very dramatic photographs of land collapses, a timely reminder, perhaps, that planners need to keep in mind industrial history when granting land use permissions!

The book contains an epilogue, Red Men and their Memories, by Maureen Fisher, that weaves a narrative from oral histories of men who worked in the mines. The fascinating descriptions of working life and the rigors of home life, illustrate just how hard it was for these people and how little security they had to protect them and their families from hardship and poverty.

The book is very well illustrated with maps, diagrams and some lovely photographs. It is a fine record of the social and industrial history of the area and I have no hesitation in recommending it to everyone, whether they know this area or not. It is a good read and a splendid ‘aide memoire’, reminding us how fortunes wax and wane, how industries thrive and decline and how society benefits and suffers, as our needs change. It is also, perhaps, a timely reminder of the finite nature of the world’s natural resources, at least within the time-span of human habitation of planet Earth!

Mike Howgate

~HANDS-ON~ GEOLOGY IN EAST LONDON

Some, not very local, geology can be seen, touched, climbed and collected at Fairlop Waters Country Park in the London Borough of Redbridge. The park has recently had a lot of money spent on improving accessibility and providing a series of nine boulders/rock faces for budding climbers to practise their skills on. These have been installed by Rockworks of County Durham and will also provide the geology student with a bit of practice in landscape identification. Although the rocks are made of concrete and are all painted in boring battleship grey, they mimic distinct landforms and rock-types. I have been able to identify Dartmoor granitic tors, Carboniferous Limestone scars and pavement, Millstone Grit rock faces and scaled up slabs of Sarsen stone from Avebury complete with root holes which double as handholes. Some of the slabs also sport casts of ammonites and trilobites.

The new cycle tracks which circumnavegate the lake also provide geological interest as the surface is dressed with very roughly graded Lower Cretaceous ‘Farringdon Sponge Gravel’. The distinctly crunchy surface provided by the calcareous sponge debris is probably kinder to bicycle tyres than more local flinty gravels would be. Just a few minutes searching produced lots of specimens including large pieces of the sponge Raphinoderma farringdonensis, worn belemnite guards, phosphatic nodules, fish teeth and a probable reptilian bone.

Mike Howgate

A selection of fossils from the cycletrack.
The day commenced just north of Ludlow at Stanton Lacy Church (SO 495 788), in Shropshire. This Anglo-Saxon church was suggested as being not unlike others in central and southern England for it preserves evidence of as many as 14 pilaster-strips on the nave and north transept (Fig. 7). These pilasters, as well as the jambs of the north nave doorway in the church, were all orientated with their bedding in Anglo-Saxon pattern (Fig. 2 of Part 1 in the September magazine’). John Potter explained that it could be shown that the Anglo-Saxons sought quality workable stone. In this instance they had found it in the slightly micaceous, coarse, felspathic, green to red sandstone from the Lower Old Red Sandstone used in the pilasters. He described how it would be easier to obtain vertical pillars of stone with the bedding placed vertically and in an edge-bedded orientation as commonly apparent in these strips, for alternative orientations would be more difficult to cut with parallel sides. Pilaster-strips were absent from churches of this period over most areas of the British Isles for the rocks in many areas were not sufficiently easy to work. Various other features were viewed at Stanton Lacy before the party drove towards the top of Titterstone Clee (SO 598 758). In doing so the Devonian and much of the Carboniferous succession had been crossed to reach the outlier of Coal Measures which caps the hill. A thick dolerite sill was evident within the Coal Measures (Fig. 8) and samples of both this and the sediments were examined. In recent times the dolerite has been extensively quarried for roadstone. John cited this relatively resilient stone as one too difficult to work for building purposes in earlier times. Where this and other igneous rocks have been found as boulders, however, they were used, as had been already noted in certain churches visited in the region.

The descent from Titterstone Clee towards Tenbury provided views towards Silurian rocks and the Pre-Cambrian Malvern Hills. From Tenbury Wells the procession of members’ cars continued into Herefordshire and finally to the ruined Edvin Loach Church (SO 661 584). John Potter suggested to members that this roofless church, again mainly of Lower Old Red Sandstone (St Maughan’s Formation) might be regarded as a ‘test piece’, one at which they might like to employ the knowledge gained on their church studies to date! Fortunately, shortage of time forced John to highlight the principal features of this complex ruin. The party was again tested at the neighbouring church of St James, Tedstone Delamere (SO 695 585). This church is on a hillside, some 200m. from the road, and members were asked what was unusual about its situation. With no desirable answers forthcoming, John pointed out that the church nave was apparently built into a pronounced topographic depression which he suggested was probably the very Lower Old Red Sandstone quarry from which much of the church was originally built. Again, travertine had been used ornamentally for the quoins and window and door frames, and in the western quoin the blocks were orientated with bedding frequently vertical to Anglo-Saxon style (Fig. 2 - see Part 1). One stone low in the SW quoin showed the trace of a cut-back, presumably the work of an over-zealous mason of the period (with cut-backs on all stones they would have aligned). The corbels at the top of these quoins were also cut-back.

Both north and south nave doorways display remnants of their earlier triangular-shaped heads in travertine (Fig. 10), a shape typically of Anglo-Saxon style. Neither possesses jamb stones sufficiently well preserved to confirm this age, for many of the original travertine blocks have been replaced when the doorways were subsequently altered.

Pre-arranged lunch was taken in a public house on Bromyard Downs from where good views, largely across Devonian rocks, were possible. The final two church visits were to the west and south-west of Hereford where again these rocks predominated. The longest drive was to the church of St Andrew, Bredwardine (SO 334 444) not very distant from the River Wye and an exposure of the Lower Old Red Sandstone.

Bredwardine Church was again built of a mixture of the local red-brown
sandstone and contrasting light-grey travertine. Where rebuilding of the earliest church had occurred the travertine was re-used in the walls in a random manner, but it was noticeably more abundant in those areas of the walls proximate to previous, now altered, doors or windows. This was particularly evident in the west nave wall where an early west doorway (or was it a window?) had been infilled. The western nave quoin, although partially rebuilt, still revealed some stones of travertine exhibiting bedding traces with vertical orientation in Anglo-Saxon style. In the north nave wall an early Norman, now blocked, doorway was observed to cut earlier herringbone work at the foot of the north wall (Fig. 11). The orientation of the travertine jamb stones remaining in the doorway proved difficult to interpret, but where the bedding could be determined in these stones, each was set in Anglo-Saxon fashion. (Norman jamb stones are typically set BH and Bedded Vertical Edge Into Arch or BVEIA). In contrast, the south doorway, which now provides the only entrance to the nave, appears to be wholly of Norman origin and it is not opposite the north door. The windows to the church required more detailed examination to interpret their age. The very large bowl-shaped font inside the church was found to be made of con- measurement would result in a 'weep'. The chancel at Bredwardine was certainly younger than the nave and subsequently it had been further extended. Attention was drawn specifically to the north wall of the chancel which showed a feature described as a 'batter' (this was not present where the chancel had been extended). A 'batter' is an inclined face to a wall, to make the wall thicker at its base. John stated that in recent years he had decided that the Anglo-Saxons never built walls with a 'batter' and that it was a somewhat later feature. Now he was seeking a Member to review his church studies, and confirm his beliefs on both 'weep' and 'batter'!

With no immediate volunteers, the party drove over the steep ridge created by a hard calcrite in higher horizons of the Lower Old Red Sandstone to the picturesque Golden Valley of the River Dore, which was followed to Kilpeck Church (SO 445 305). Asked why the valley was described as 'golden' when it was clearly very green, John suggested that it was probably related to the geology. The excellent grasslands provided by the lowest of the Lower Old Red Sandstone rocks would certainly have made farming very profitable in the valley.

The church at Kilpeck has attracted much attention and comment for its Norman ornamentation is quite outstanding. Carvings are excellently displayed in the south doorway, the west window, at the eaves level, and elsewhere. They have been credited to a specific group of talented artists described as the Herefordshire School of Sculpture, which is thought to have been active in the period about 1130 to 1160. A Celtic influence is thought to be evident in some of the work. One of the many carvings at eaves level, a sheelagh-na-gig, despite being somewhat gruesome and distasteful, attracts more photographs than any other. Such carvings, which exhibit a female figure with exaggerated genitalia, are common in early Irish churches and round towers. Their presence has been discussed at length. Were they possibly a fertility carving or were they thought to afford protection for the church and its possessions? John supported a more basic view: he suggested that the all-male monastic society involved in the work had simply behaved much as deprived (or possibly depraved) boys in an all-male school who sometimes carved similar figures on their desks!

But John drew our attention back to geology and the Anglo-Saxon NE nave quoin and its immediate adjoining walls. The lower stones in the quoin were emplaced in typical Anglo-Saxon fashion and the sandstone lithologies of the Lower Old Red Sandstone were unlike those seen in the Norman walls. There were traces of an old, blocked, arched doorway visible in the adjoining north wall of the chancel. These were also possibly of Anglo-Saxon origin. Next, the party examined the typical Norman flat buttresses and clasping quoins, and noted the differences in stonework style seen between them and pilasters and quoins observed in churches like Stanton Lacy of the previous day. Inside the church the large distinctive cornstone font closely resembled that seen at Bredwardine.

With John still answering questions and discussing problems related to this church and others seen over the weekend, those with the longest homeward journey now started to depart. There is obviously a vast amount still to learn from the study of ecclesiastical geology!

Bibliography


FIELD MEETINGS IN 2011

We are hoping to arrange additional fossil collecting opportunities during the year. There may not be time to advertise these in the Circular so if you would like details when they become available contact Sarah Stafford at the GA office. Please also refer to our web site: www.geologistsassociation.org.uk for any changes to the programme and for finalised dates.

LONG WEEKEND ON THE ISLE OF WIGHT
Leader: Prof Andy Gale
Friday, March 11th - Sunday March 13th 2011
The Isle of Wight is a classic area of British geology. We will be examining the Cretaceous and Tertiary rocks of the island both in terms of their sedimentology and structure. There will be opportunities for fossil collecting. There will be a fair amount of walking involved together with some cliff climbs. Attendees will need to be sure they are capable of achieving this.

Equipment: You will need a hard hat and suitable clothing for the time of year.
Cost and booking: Numbers will be limited to 20. Further details will be available from Sarah Stafford at the GA office. Please note that the GA will not be booking accommodation. Register with Sarah sending an administration fee of £5 per person to confirm your place. If there is sufficient interest we will arrange a meal on the Saturday evening, probably in Shanklin.

RETURN TO EASTBOURNE
Leader: Geoff Toye
Saturday 19th March 2011
Another opportunity to collect from the chalk of the Eastbourne area with plenty of fossils in prospect. This trip involves a walk of over a mile along a rocky foreshore. Attendees will need to be sure they are capable of achieving this.

Equipment: Hard hats are advisable, together with clothing suitable for the conditions.
Cost and booking: Further details will be available from Sarah Stafford at the GA office. Register with Sarah sending an administration fee of £5 to confirm your place.

THE INFERIOR OOLITE OF DORSET & SOMERSET
Leader Robert Chandler
Saturday 30th April - Sunday 1st May 2011
Dorset and Somerset has some of the most fossiliferous exposures of Middle Jurassic, Aalenian and Bajocian rocks in Britain, there termed the Inferior Oolite. Exposures are mostly located in long disused quarries and a coastal section from which fossils may be collected from boulders on the beach. Some are classical key sections from which many figured mollusc specimens have been obtained. The trip will be used to describe the mode of deposition and startling variation in these rocks across very short distances and how these strata can be subdivided on the basis of fossils content. Emphasis will be on the sedimentology of these rocks. Attendees will need to be sure they can safely cope with the conditions to be found in working quarries.

Equipment: Hard hats and hi-vis vests are mandatory.
Cost and booking: Numbers are limited to 20. Further details will be available from Sarah Stafford at the GA office. Register with Sarah sending an administration fee of £5 to confirm your place.

GEOLOGY AND BUILDING STONES OF NE ENGLAND
Leader: Prof John Potter
Saturday 28th - Monday 30th May 2011
Following the successful excursion to examine ‘Early Churches and Fossils of the Welsh Borderland’ in May of this year (see report in this issue of the magazine), a number of members asked if a similar joint geology and building stones excursion might be conducted to North-East England. Given the costs involved in arranging longer excursions members are advised of the possibility of such an excursion and be asked to express their interest well in advance of the date of the excursion.

The excursion would involve two (or possibly 3) centres and involve members travelling by car, a charge of £20 (2 days) or £25 (3 days) would be made according to the length of the excursion. We would visit and examine the
building stones of some of Britain's most interesting churches - such as Escomb, Jarrow, Monkwearmouth, Warden, Corbridge (and Hadrian's Wall) and the Bywells, as well as a range of geological localities such as Marsden Beach (Britain's Best) to collect flexible sandstone, etc; Permian fossil localities, Carboniferous and igneous rocks. Day 3 would involve Lindisfarne (Holy Island), and the rocks of Dunstanburgh and Bamburgh Castles. Note that 30th May is a Bank Holiday.

Equipment: A quality lens and binoculars. Packed or pub lunches.

Cost & booking: Please register now with Sarah Stafford at the GA Office, sending the appropriate administration fee. A minimum of 15 persons will be required for the excursion to occur (maximum 25) and registration must be completed before the end of February 2011 for the excursion to take place. Money will be returned if the numbers are insufficient. Further details will be available from Sarah Stafford at the GA office. Please note the GA will not be arranging accommodation. An alternative trip is planned for October if there are insufficient numbers.

A JURASSIC RAMBLE IN THE BRISTOL DISTRICT
Saturday 4th June 2011
Leader: Simon Carpenter

A day exploring the Jurassic rocks of the Bristol District starting in Saltford a small village close to Bristol where Simon’s interest in geology began. Lower Jurassic fossils collected by Simon will be shown at the start of the day to illustrate the wealth of invertebrate and vertebrate fossils likely to be found in the local Lias.

The morning will be spent examining a number of geological exposures around Saltford. Following a pub lunch it is hoped that during the afternoon other Jurassic localities will be visited several miles from Saltford. Bring hammers as some collecting will be possible. Attendees will need to be sure they can safely cope with the conditions to be found in working quarries.

Equipment: You will need a hard hat and hi-vis jacket together with suitable footwear.

Cost & booking: Numbers will be limited to 20. Further details will be available from Sarah Stafford at the GA office. Register with Sarah sending an administration fee of £5 per person to confirm your place.

EXCURSION TO EXPLORE THE PRE-ANGLIAN DRAINAGE OF THE EAST MIDLANDS
Saturday 11th – Sunday 12th June 2011
Leaders Jim Rose, David Bridgland, Tom White, Rob Westaway, Jon Lee and Martyn Bradley

Following the success of the 2010 visit to the Castle Bytham area this is a two-day meeting combining visits to quarries and consideration of geomorphology. To include (to be confirmed): quarries at Waverley Wood, Huncote, Castle Bytham and the Hinckley, 'Derby' and Ancaster palaeovalleys. Attendees will need to be sure they can safely cope with the conditions to be found in working quarries.

Equipment: You will need a hard hat and hi-vis jacket.

Cost and Booking: Numbers may be limited. Further details will be available from Sarah Stafford at the GA office as logistical details are still to be arranged. It is likely to include making individual arrangements for accommodation in the general area. Coach/minibus transport will be arranged if required and the administration fee will be set as necessary.

PLEISTOCENE INTERGLACIAL SEDIMENTS OF STUTTON, SUFFOLK
Sunday 10th July 2011
Leaders: Graham Ward and Bill George

This meeting follows on from our visit to Wrabness and Harwich in 2010. We will examine the Pleistocene (Oxygen Isotope Stage 7) interglacial sediments exposed on the foreshore opposite Wrabness which have yielded a freshwater fauna including Corbicula flat nalis together with elephant tusks, teeth and bones. The London Clay is also present with excellent exposures of seams of altered volcanic ash.

There is a walk of c 3 miles to and from the beach which is itself c 1 mile long. Participants will need to be sure they are up to this amount of walking.

Equipment: Boots, waterproofs and a packed lunch.

Cost & booking: Numbers will be limited to 20. Further details will be available from Sarah Stafford at the GA office. Register with Sarah sending an administration fee of £5 per person to confirm your place.

A CHALK WALK ON THE CABURN BLOCK, LEWES
Leader: Rory Mortimore
Saturday 15th October 2011

This will be to the Mount Caburn Pits, Lewes (see GA Guide No.57 The Chalk of Sussex and Kent, Itinerary 1). We will spend the morning in the pit and on a short walk around Malling Hill past New Pit. In the afternoon we will walk to Mt Caburn via the Glyndebourne Pits. Each walk will be about 2-3 km of relatively easy downland walking but will require good walking boots!

Equipment: Hard hat and hi vis jacket are mandatory. Wear suitable footwear. Packed lunches.

Cost & booking: Numbers will be limited to 20. Further details will be available from Sarah Stafford at the GA office. Register with Sarah sending an administration fee of £5 per person to confirm your place.

FOSSILFEST VII
Leader: Nev Hollingworth
October (date to be confirmed) 2011

Location(s) have still to be decided but plenty of fossils can be expected. Attendees will need to be sure they can safely cope with the conditions to be found in working quarries.

Equipment: You must have a hard hat, hi vis vest and suitable footwear.
Cost & booking: Numbers will be limited to 25. Register with Sarah Stafford at the GA office sending an administration fee of £5 to confirm your place.

PLEASE ALSO REFER TO OUR WEB SITE: www.Geologistsassociation.org.uk FOR CHANGES TO THE PROGRAMME AND FOR FINALISED DATES

Overseas Trips 2011

FRANCE: Leader: Dr Paul Olver: this trip is now full.

JAPAN
Leaders: Dr Francis Hirsch, Dr Mike Ridd, Mrs Mikiko Ridd
Plans are progressing well for this field meeting in November 2011. It will commence in Kyoto and make its way across the island of Honshu to the Japan Sea and then back across Honshu, the Inland Sea and the island of Tokushima, before taking the bullet train to Mount Fuji and finally Tokyo.

GEOLOGISTS’ ASSOCIATION
LOCAL GROUPS
Cambridgeshire Geology Club
December 13 Tectonostratigraphic Evolution of Cyprus - Dr Tim Kinnaird.
January 10 Cambridgeshire River Systems - Karen Paterson - River Inspector Great Ouse & Stour Waterways - Environmental Agency
February 14 The Mountain Belts of the Himalayas - Dr Thomas Argles
March 14 That Sinking Feeling or Cambridge-on-Sea - Dr J Patrick Doody
Contact - Ken Rolfe on 01480 496973. www.cambridgeshiregeologyclub.org.uk

Harrow & Hillingdon Geological Society
January 12 Orcadian Basin then and now - John Stanley. The Ochre’s of Roussillon and the Canyon of Verdon - Bryan Tabor. La Bra Tar Pit Museum - Prof. Nigel Harris.
Contact John Cooper 01273 292780 email: john.cooper@brighton-hove.gov.uk

Carn Brea Mineral Society
January 18 Knockshinnock (Ayr Scotland) Colliery Disaster-Lawrence Holmes
February 15 Veskhod Mine Development Project, A Steppe in the correct direction. - Robin Boon
Contact for details Eileen Fraser 01260 271505

Cumberland Geological Society
January 19 Annual General Meeting (7pm) Held at the Booth Museum, all contributions, geological or festive food and drink, welcome!
January 5 On the trail of Ice Age hunters in Sussex - Dr Matt Pope.
February 2 Wealden Fishes - Dr Peter Forey.
March 2 The enigmatic volcanoes of Mongolia - Prof Nigel Harris.
Contact John Cooper 01273 292780 email: john.cooper@brighton-hove.gov.uk

The Kirkaldy Society (Alumni of Queen Mary College)
April 1 Annual Dinner
April 16 One day excursion to the Chalk of north Hertfordshire and South Cambridgeshire - Mike Howgate.
Contact David Greenwood 020 8449 6614 email:kirkscott@sky.com.

Mole Valley Geological Society
13 January. Global cooling: perils & prevention. Professor R C Selley, Imperial College
16 February. Members evening with micro-lec-turettes.
March 10. Gemstones - properties, occurrence and economic value. Professor A Rankin. Kingston University
www.radix.demon.co.uk/dendron/mvgs/ Email: Chas Cowie: chas.cowie@itsciarl.co.uk

North Staffordshire Group
January 13 Bio-geochemical cycles; Bugs, bogs and labs - Dr Rebecca Bartlett.
February 10 Coal bed methane - Professor Peter Styles (Keele University)
March 10 AGM and Chairman’s Address: British Earthquakes - Dr Ian Stimpson (Keele University)
Contact for details Eileen Fraser 01260 271505
Contact Field trips: Gerard Ford 01630 673409.

Ravensbourne Geological Society
December 14 Christmas Festivities and Competitions.
January 11 Darwin and the Landscape - Alister Hayes.
February 8 Early Hominid Development - Chris Stringer.
March 8th to be confirmed.
April 12 Chalk from the Downs to the London Platform - Rory Mortimore,
Contact Carole McCarthy Secretary: 020 8854 9138 email: cmccarthy@talktalk.net or Vernon Marks: 020 8460 2354.

Cydeadhys Th Daeareagwyr Gwrp De Cymru - South Wales Group -
December 11 Geologists on Ice: early exploration of polar rocks.
January 22 Methods and techniques in Quaternary geosciences: reconstructions of the last British Ice sheet - John Hiemstra.
February 19 Tuffs and Traces: biodiversity in terrestrial environments in the Upper Silurian Old Red Sandstone of Southwest Wales.
Contact Lynda Garfield at secretary@swgga.org.uk

West of England
January 18 3 Research Students Various topics Bristol University
February 8 Ian Stewart Horstmann Lecture Plymouth University
March 8 Dinosaur Island - Steve Sweetman.
April 19 AGM
Contact Allan Insole email: secretary@wega.org.uk

West Sussex Geological Society
December 17 Members Christmas Evening.
January 21 Giant foraminifera of the Eocene; the life and times of Nummulites - Laura Cotton.
February 18 AGM.
March 18 Low Cost and remote sensing to aid disaster risk reduction - Dr Naomi Morris.
April 15 Space Science at MSSL - Dr Grazia Branduardi.
Contact Betty Steel 01903 209140 Email: kande16@talktalk.net

AFFILIATED SOCIETIES

Amateur Geological Society
December 14 Iron Ore Mining in West Cumbria - Dave Greenwood.
January 11 AGM and New Year Party.
February 8 The Ediacaran Rocks and Fossils of England and China - Chris Darmon.
Contact Julia Daniels 020 8346 1056. or Dave Greenwood agfs@mch在玩家.com , field trips: john.wong@hertscc.gov.uk

Bath Geological Society
February 3 Annual General Meeting - Making and Breaking Mountains -Dr. Tom Argles.
February 26 Field trip: Brown’s Folly Nature Reserve - Elizabeth Devon.
March 3 Evolutionary generalities lie in the ecological detail The Red Queen and Court Jester? - Dr. Thomas Eardly.
March 12 Field trip: Landscape features of the Gault and Upper Greensand in the vicinity of the Warminster Fault - Isabel Buckingham.
April 7 Caves and Cannibals: A Mendip Perspective - Professor Danielle Schreve.
May 14 Field trip: Saltford - a geological ramble - Simon Carpenter.
www.bathgeolsoc.org.uk

Belfast Geologists’ Society
January 24 Volcanoes of the African Rift - Professor Barry Dawson.
February 12 Annual Dinner.
February 21 The Planet in a Pebble - Dr Jan Zalasiewicz.
March 21 The Geo-Archaeology of Newgrange. Co Meath - Dr Ian Meighan.
Contact Peter Millar 9064 2886, email: peter.millar@ireland.com.

Brighton & Hove Geological Society
December 15 BHGS Christmas Conglomerate - held at the Booth Museum, all contributions, geological or festive food and drink, welcome!
January 5 On the trail of Ice Age hunters in Sussex - Dr Matt Pope.
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March 2 The enigmatic volcanoes of Mongolia - Prof Nigel Harris.
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January 18 Knockshinnock (Ayr Scotland) Colliery Disaster-Lawrence Holmes
February 15 Veskhod Mine Development Project, A Steppe in the correct direction. - Robin Boon
March 19 Society Annual Dinner, Tyacks Hotel Camborne.
April 19 Society Annual General meeting followed by Holman archive film.
May 15 Mineral processing in Turkey - Ops Manager SGS Minerals Services UK.
May 17 Mine Rescue - Terry Mankee.
Contact Lincoln James 01326 311420

Cumberland Geological Society
January 19 Solving the Basset Hawthwaite Mystery: Magnetic fingerprinting of fine Sediment sources - Prof. Barbara Maher.
February 23 Taming the Tsunami: learning the lessons- from December 2004 and preparing for the next one - Dr Gordon Curry.
March 9 AGM www.cumberland-geol-soc.org.uk.

The Devonshire Association (Geology Section)
January 15 AGM Naturian Rocks to Dartmoor streams How have dragonflies evolved? Dr Robin Woolton.
Contact Jenny Bennett 01647 24033 email j.a.bennett@exeter.ac.uk

East Midlands Geological Society
December 11 The Earth after us - Jan Zalasiewicz.
January 15 Britain in the Freezer - a long term perspective of Quaternary Ice Ages - Jonathan Lee.
February 12 The Last 50 years of Mineral Exploration in Britain - Tim Colman.
Contact Secretary Janet Slater email. J.slatter@zoom.co.uk

www.emgs.org.uk

Edinburgh Geological Society
January 19 Annual General Meeting (7pm) (University of Edinburgh) Forecasting rock failure: from the lab to volcanoes and earthquakes - Professor Ian Main
February 2 The James Wright Memorial Lecture - joint with the Geological Society of Glasgow Professor Iain Stewart (University of Plymouth) Scotland Rocks!
February 16 What do we really know about the
glaciation of Scotland? - Dr Tom Bradwell
March 2 Natural Born Killers: the nature and hazards of March 16 New Light on Dark - Dr Sarah Davies
March 30 Global Nitrogen - Professor David Fowler
www.edinburghgeolsoc.org

Essex Rock and Mineral Society
December 14 Annual Social.
January 10 Lecture: AGM Followed By
Reading Geological Society
www.dur.ac.uk/g.r.foulger/NEGS.html
mavisgill@btinternet.com or 01207 545907
Contact  Joanne Norris 0116 283 3127
Email:j.e.norris@ntlworld.com.
www.northeast-geolsoc.50megs.com Email:swift@ianfenwick.f2s.com., www.wgcg.co.uk
March 16 Activity on Mount Etna - Prof.
the Presidential Address.
WGS.
February 16 Members evening to identify speci-
mens.
February 17 Field Trip to Wheel Trewavas,
Porthleven. Leader Stephen Polglase.Meet at the rear car park Pub in Ashton 1-30pm
April 20 Dr E Adey.Social Impacts of Mining using examples from
Romania,Russia,Sweden,Bosnia Herzegovina and Cornwall.
May 18 Dr Chris Page Discusses his work on Plants and Forests throughout Geological Time:What can we learn from combining Geology and Biology, and his next major book.
Contact nplummer@cornwall.gov.uk Telephone answer phone 01209 860410
Or contact the website www.rgsoc.org

Shropshire Geological Society
January 12 Shropshire Unconformities - Dr Peter Toaghil.
February 9 Longmyndian fossils - Alex Liu, Palaeobiology Group within the Department of Earth Sciences at the University of Oxford.
March 9 Stone Dr Ian Thomas, Director of the National Stone Centre.
www.shropshiregeology.org.uk

Stamford and District Geological Society
December 8 Icelandic Volcanoes 2010 and Beyond - John Aram.
January 12 The Antarctic - Dr Alistaire Graham.
February 9 The Jambi Permian Flora of Sumatra and its Geological Setting - Dr Mike Crow.
March 9th AGM.
Contact: Bill Learyd on 01780 752915 email: billearyd@aol.com, clifflnicklin@aol.com;
(WGS)

Warwickshire Geological Conservation Group
December 15 Members' posters, displays, short talks.
January 19 More fascinating fossils - Hugh Jones. February 16 subject and speaker to be confirmed.
March 16 Antarctica Rocks - Tom Sharpe.
Contact Ian Fenwick 01926 512531 emails swift@ifenwick.2s.com., www.wgbc.co.uk

Westmorland Geological Society
December 15 Jacob's Join and members' night.
January 19 The Silverdale Disturbance - follow up to the summer excursion - Dr Colin Patrick, WGS.
February 16 AGM starting at 7:45pm following by the Presidential Address.
March 16 Recent Activity on Mount Etna - Prof. Harry Pinkerton, University of Lancaster.
Contact Brian Kettle email: mr.briankettle@tiscali.co.uk

The Woolhope Naturalists’ Field Club
January 21 A Geological tour of North East Greenland - David Rex.
February 25 AGM and Section Dinner.
March 18 The Magallanes Basin in Southern Patagonia - Dr Bill Fitches.
April 3 Gore Quarry and Stanner Rocks - Dr Geoff Steel.
Contact Sue Hay on 01432 357138 or svh.gab-bros@btinternet.com

Yorkshire Geological Society
February 21 A Geological tour of Durham: Joint meeting with North Eastern Geological Society
February 26 University of Leeds: Recent Advances in Palaeontology and Palaeoclimatology
March 27 Recent Advances in Carbon Capture and Storage
Contact Trevor Morse 01833 638893
www.yorksgeolsoc.org.uk

16

GA Magazine of the Geologists’ Association Vol. 9, No 4, 2010
Japan - A planned GA field meeting in November 2011

With its courteous and friendly people, magnificent mountain and coastal scenery and unique culture, Japan is an attractive destination for the adventurous traveller. Add to that a fascinating geological history reflecting its position on the active boundary between the Asian continent and the Pacific Ocean and you have the ideal place for a GA field meeting.

Plans are well advanced for a field meeting of about 20 days in November 2011. After the oppressive heat of summer with its risk of typhoons, and before the onset of winter, autumn in Japan is a season of pleasant temperatures and it is when the landscape is aglow with the maples and gingko trees at their colourful best. We shall fly to Kansai Airport, the spectacular new entry point into Japan built offshore south of Osaka (see map), and then transfer to Kyoto, the historic former capital. There we shall have ample time to explore the temples, shrines and Zen gardens for which Kyoto is famous and, of course, the historic district of Gion with its kimono-clad geishas.

The geological part of the trip takes the form of a traverse across the grain of the country between the Pacific Ocean and the Japan Sea. We shall examine a series of tectonic slices stacked on top of each other as the Pacific plate was subducted westwards, at times beneath the edge of the Asian continental plate and at other times beneath a volcanic arc which migrated seawards from the continent’s margin as a back-arc basin opened behind it. That latter pattern is the one we see today, with subduction taking place beneath the Nankai Trough (offshore, in the Pacific Ocean); a volcanic arc running the length of the country; and the Japan Sea being the back-arc basin separating Japan from the Asian continent. This offers a wide range of geological interest: oceanic sediments and lavas, granite plutons which worked their way up from the deep subduction zone, ancient and active andesite volcanoes, and fossiliferous shallow-marine and continental deposits, the latter having yielded a range of dinosaurs which we shall see in the excellent museum at Katsuyama.

From the Japan Sea, coast the Japan Sea coast the traverse will take us back across the country, staying at Himeji on the way, with one of Japan’s best preserved castles (see photograph), built in 1580 by warlord Hideyoshi. Beside the castle on the site of the old samurai quarters is the delightful Kokoen garden, with its waterside pavilions and arbors where one can enjoy macha served in the traditional tea ceremony. We shall take the ferry to the large island of Shikoku with its famed 88 temples, attracting pilgrims from all over the country, some in their traditional white robes wishing to fulfill their ambition to visit all of them on foot. Geologically Shikoku provides the opportunity to see the Median Tectonic Line (MTL), a 1000 km-long wrench fault and a major terrane boundary. We shall spend one night in the city of Matsuyama where those wishing to experience one of Japan’s favourite forms of relaxation can enjoy the hot springs of Dogo Onsen, possibly the oldest bath-house in Japan and certainly the most famous. Shikoku is the least populated major island of Japan and much of it is forest-covered mountainous terrain cut by deep ravines. Coastal outcrops near Sukumo will allow us to examine the youngest of the ocean-bed deposits, and from there we shall continue to Kochi, a city famed for its 400 year old castle, and thence to Tokushima.

The last leg of the journey will be by shinkansen (bullet train) from Kobe, site of the 1995 earthquake which killed over 6000 people. The train will take us north-east to Mt Fuji (3776 m), the fabled volcano which has become an emblem of Japan. There, if snow conditions allow, we shall drive by coach up to the 5th Station at about 2300 m. And finally we shall have the opportunity to explore Tokyo, arguably the most modern city in the world but also a city bursting with historical, cultural and gastronomic interest. Guides will be on hand to ensure that not a minute in this exciting city is wasted.

The GA is fortunate in having Dr Francis Hirsch agree to lead the geological part of this field meeting. Francis is retired and lives on Shikoku where he continues doing research at Naruto University of Education; he has published widely on the geology of SE Asia, Europe and the Near East. He will be assisted by Mike and Mikiko Ridd.

The field meeting is not expected to include walking over very long distances but is likely to include some ‘off-road’ stretches, for example, examining outcrops in river beds or along coastal sections. A reasonable degree of fitness will therefore be necessary to fully enjoy the trip. Western food as well as Japanese is widely available, and if you enjoy sushi you’ll believe you’re in heaven. GA members interested in participating should contact Sarah at the office, and those more interested in the geology than the cultural and gastronomic aspects of the trip may wish to read ‘Interpretations of the tectonic evolution of Southwest Japan’ in the PGA, Vol. 93, pp. 131-145, 1982, by our own A.J. Barber.

Michael F Ridd

Himeji Castle, built in 1580 by the warlord Hideyoshi, is one of many non-geological highlights to be visited on the 2011 field-meeting.
Along the Mimram Valley and the Chiltern Scarp west of Hitchin
Leader : Mike Howgate Sunday 13 June 2010

Ten members met up at the Wyvale Garden Centre, Codicote in North Hertfordshire and after a brief introduction to the local geology decamped to the coffee shop which had fortunately just opened. Suitably refreshed we set off on foot for Codicote Heath, a patch of glacial sands and gravels laid down at the margin of the Anglian Ice Sheet about half a million years ago.

The gravels we examined were mainly poorly sorted, well rounded to sub-angular flints, but a large cobble of well bedded quartzite from the Bunter of glacial sands and gravels laid down at the margin of the Anglian Ice Sheet about half a million years ago.

The wells almost certainly tap a fissured hard bed in the chalk, the Melbourne Rock, and account for up to 90% of the flow of the river Mimram at this point.

We then descended the steep glacial ridge down to the river Mimram. It was quite easy to imagine that we were on the Terminal Moraine or a Kame fronting the ice sheet of 500,000 years ago. We followed the course of the Mimram, a classic chalk stream, which is here diverted from its pre-Anglian course to flow across the Chalk along the margin of the Ice Front.

At Kimpton Mill there is clear evidence for the competing 'industries' along this chalk stream: the mill pond and mill race for the grinding of corn, the River Keeper's cottage to ensure the riparian rights of the angler are not infringed and just up the lane the recently reinstated Watercress beds. The walk back to Wyvale for lunch reinforced the geology and sharpened the appetite.

After lunch we called in at the appropriately named 'Nine Wells' Watercress Farm at Whitwell, where we were shown one of the nine 200 foot deep artesian boreholes by our host Mr. Sansom, The water pressure was demonstrated by partially blocking the pipe with a convenient cement block.

The group investigate an artesian borehole at Nine Wells watercress farm, Whitwell.

The giant ammonite Parapuzosia austeni above the door in the south transept of St. Mary's church, Pirton.

The group on a narrow bridge crossing the river Mimram at Kimpton Mill.

The summit was pock-marked with 'flint mines', like a miniature Grimes Graves, indicating that we were in the Upper Chalk. From near the Trig Point we were treated to a view across the Lower Chalk mini-scarp at the foot of the main escarpment and the Gault Clay plain beyond to the distant Greensand ridge on the horizon marked by the prominent radio mast at Sandy.

Our final stop was St. Mary's church, Pirton. The church has a Norman chancel arch, but externally it is predominantly Victorian/Edwardian. It was during the building of the north transept in 1907 that several pieces of the gigantic ammonite Parapuzosia austeni were found in a nearby quarry in the Totternhoe Stone which is now overgrown. The pieces of ammonite are, however, prominently displayed in the north transept above the door and in the north wall of the nave between the transept and porch.

This quarry also yielded a fine specimen of the fossil fish Ctenothrissa radians which used to be on display in the church but was unfortunately stolen twenty years ago so all we saw was a rather fuzzy photograph. Coincidently, two very similar fossil fish also went missing from the Sedgwick museum collection at about the same time! Anyone who may know of the whereabouts of these quite distinctive fossils can contact me in confidence on 020 888 22606 or mehowgate@hotmail.com.

Mike Howgate
Photographs Linda McArdell
Introduction

The GA has not visited Germany, in particular Central Germany, for many years, but this latest visit was highly successful in showing us some unfamiliar areas of the country, especially the border areas of the former East Germany, and what advances in geological conservation had been achieved in the marvellous GEOPARK centred on the Harz Mountains.

Away from these mountains, most of central Germany that we saw was flat farmland or gently rolling fields and woodland, with occasional hills resulting from salt-dome uplift or marking igneous intrusions. Prominent in the landscape at some locations were large factories and power stations sited close to geological resources such as Permian salt and Tertiary brown coal deposits, with extensive wind farms in some areas. Attractive towns and villages of traditional wood-framed houses are common, and we were welcomed to several of these.

Our visit concentrated on parts not so well known by tourists, much of it including areas of the former German Democratic Republic which was reintegrated with the Federal Republic of Germany only 21 years ago, and which has seen a great upgrading of facilities and economic activity since then despite many people having migrated to the west where employment opportunities were greater. We stopped to see a section of the former border, preserved with all its walls, barbed wire and watchtowers.

In particular, we were welcomed by local geologists whose good English shamed our poor command of German, and by local Burgomeisters (Mayors) who were delighted to see visiting geoscience tourists impressed with the geology and the thriving Geopark. The GA trip was skilfully led by leaders from Frankfurt - Professor Alan Lord, Dr Volker Wilde and his wife Dr Silke Clasen (a geologist who works in an archaeological context), and the various local experts they had invited to join us for part of a day or more.

We were pleasantly accommodated in a hotel in Halle, near Leipzig, and in the 13th century Warburg castle near Helmstedt to the northwest, which allowed us to visit many scattered localities by a coach skilfully driven by Frank.

The trip climbed up the stratigraphic column from the Carboniferous to the Quaternary but, inevitably, there were some places that were not in sequence depending on geographical position.

Halle By Foot And Tram
Saturday August 21

Halle, the name derived from an old pre-germanic name for salt, and Saale (also a derivative of salt) the main river running through the city, indicate why the city grew and is sited in this area. Salt has been mined and harvested here since the Bronze Age, for 4000 years. There is a fault line which runs through the market square of Halle which has been active since Carboniferous times. The Geoscope is a recent addition to the Marktplatz and allows you to look down below street level to the fault line. Salt water used to leach through the fault with 20% salt concentrate in it. Until 1880 the market place was filled with wood, reed and clay-built huts and cottages where the brine was processed. 10,000 people lived here in the Bronze Age. There were five main areas where natural springs came to the surface. Later, 4 artesian wells and 30 bore holes were dug. When these began to dry up shafts were built to pump up the brine from a depth of up to 600m. Initially wood and straw were used for the fires for brine extraction, then coal was used, but sulphurous gases were a health problem.

Along the Saale we examined a wall made from two distinct types of porphyry. It was once thought that the 'younger' porphyry, with smaller feldspar inclusions, had been formed at a later time than the 'older' porphyry, but our guide, Dr Ehling, explained that it has recently been discovered that both porphyry types had been formed in the same magma chamber but introduced at different times.

The Geiseltal Museum, founded by Prof. Dr. J. Weigart in 1934, was visited and we were fortunate to have the present day curator, Dr. Hellmund, to show us around. The museum is housed in a former 16th century chapel and dedicated solely to Eocene fossils. In the brown coal seam around the Geisel river area 30,000 specimens have been found. Acids which would normally destroy soft tissues and sometimes bones and teeth had been neutralized by the local calcareous waters flowing into the river basin so that the carcasses about to be fossilized were preserved with a 3D appearance. The first fossil bones of a tortoise were found in 1908. In 1993 the last bones were dug out when coal mining ceased. Colour retention in insects and leaves, muscle structures, traces of blood, skin, feathers and stomach contents all attest to the special preservation features of this site. Unique fossils preserved here include Psiloptera acropteris - jewel beetle, Lophiodon-tapir like, Diatryma-ostrich like and the beautifully preserved Propalaeotherium -ancient horse and the museum's emblem.

Reconstructed skeleton of Small Horse, Geiseltal Museum Photo JC
A tram ride took us to the last visit of the day, The Landes Museum, The National Museum of Prehistory of Saxony-Anhalt, where Dr Silke Clasen guided our tour. The museum houses the famous Nebra Sky Disc, a bronze disc about 30 cm across. It is inlaid with small gold circles, a large sun or full moon, a crescent moon and two gold arcs. There is also a striated smaller arc at the bottom. The disc, rediscovered in 1999 near Nebra is thought to date to 1600 BC and is the earliest known depiction of the heavens. Other exhibits featured key archaeological sites in Sachsen-Anhalt. Blizingsleben seems to have been the oldest campsite in Germany with evidence of Homo erectus, dating back 370,000 years. It was a permanent camp on the shore of a lake. Many tools, artifacts and food remains have been recovered there as well as sites of hearths and circular shelters. Another site, Neurmark Nord, appears to have been a hunting site where many elephant bones and remains of deer, fish, lions and hyena have been found whilst mining recently for brown coal. Elephant butchering at a site named Groben can be proved from scarred bones found in the lake there and flints found nearby. The museum’s displays are beautifully and clearly presented: flints dating from 450,000 yrs, Mesolithic skeletons, an astounding wall display of axe heads dating back 6,900yrs, (including a lovely jade axe head from the Alps 6,300yrs old), as well as pottery and weapons.

**Sunday 22 August**

The day began with a drive through Neustadt, a northwest suburb of Halle, an area of high-density flats for workers typical of development in the former DDR. Further on, the surrounding countryside had extensive underground salt and potash workings with isolated factories marked by heaps of excess salt waste known locally as “Kalimandscharo”.

The older rocks of the Harz massif are concealed in the east, but as we travelled west the boundary between the Palaeozoic block and the Mesozoic and Tertiary cover became more marked with high, tree covered ground to the north and gentle undulating farmland to the south. This brought us into an area where the landscape was dominated by a few huge conical spoil tips that marked the location of large underground copper mines exploiting the Permian Kupferschiefer.

This was seen in more detail at the Röhrigschacht copper mine at Wettelrode near Sangerhausen where, after descending 283m and travelling over 1km by mine car, we were given a guided tour by Dr Carl-Heinz Friedel of the Sachsen-Anhalt Geological Survey.

**Monday 23 August**

Northwest of Halle is the medieval town of Wettin, formerly the home of the Saxony kings. The fine castle was built on top of a steep slope above the River Sall. The rock being the Permian Rotliegendes age porphyry intrusion that we had seen in Halle, Wettin was an Upper Carboniferous coal-mining area and we stopped at the King’s Mine to look for fossils.

At Dobis we had a short walk to see the ‘Weisse Wand’ (White Wall), a bare rock exposure of the Porphyry con-
The Lower Triassic clay pit at Beesenlaublingen provided a very interesting visit. The extensive area of the clay from the Bernburg Formation in the Buntsandstein is no longer mined but the thick layer of oolitic (Rogenstein - fish eggs) limestone above the clay enabled the fossil-hunters to get close to the rock which showed shallow-water features, e.g. ripple marks, dessication cracks and some fossils.

We visited the magnificent Bernburg castle which was built on a steep cliff above the River Saale on Bunter sandstone. Dr Klaus, the former custodian of the mineral museum inside the castle welcomed our group and explained the importance of the historic collection from the local mining minerals which included fine examples of galena showing octahedral faces and a huge piece of mica.

In Germany the Muschelkalk ("mussel limestone") is a prominent middle Triassic marine formation, and we visited it in the large Solvay quarry at Bernburg. The coach drove down a steep track into this huge pit in the pouring rain (would it get out again??). The grey fine-grained limestone yielded numerous fossils in some beds, including several preserved as hollow casts. The limestone is used for making cement but, due to its high Ca content, sand and siltstone have to be added to the manufacture. We asked if the operations produced any waste - "None" was the proud answer.

Tuesday 24 August

On our way to the second hotel, in Bernburg, we looked at a karst landscape formed in evaporites, near Sangerhausen. Dr. Holger Piegert invited us into the Infocentre of the UNESCO World Heritage Site of the Karstlandschaft Südharz in Rosla. The centre exhibits explained the various karst features of this area. Dr. Piegert led some of the group up to the top of the Permian Zechstein gypsum to examine the karst structures and scenery. A small number walked through the trees growing out of the weathered cracks in the green-covered karst pavement; and then on to the picturesque village of Questinberg.

At Ilfeld, Dr. Klaus George, of the Geopark Harz welcomed us at the 'Lange Wande', a copper mine, worked as least as far back as 1688, where he explained the Permian succession, including the Kupferschiefer seam of copper ore. After a typical miner's lunch, provided by volunteers, inside this historic mine tunnel, we were shown around the mine by one of the volunteers who man the mine for visitors. The next visit was to another mine, the Robensteiner Stollen in Upper Carboniferous coal measures. The train ride and a guided walk through the tunnels involved walking up and down...
Wednesday 25 August

In the distance we could see the jagged outline of the spectacular ‘Teufelsmauer’ (Devil’s Wall) which is a popular tourist spot. When the hard Palaeozoic block of the Harz Mountains to the south was pushed northwards during tectonic movement, the north side of these mountains was thrust upwards against the major fault so that the horst became unevenly tilted. The adjacent edge of the Upper Cretaceous quartzites of the Teufelsmauer were also forced upwards and slightly overturned. This fine-grained quartzite has been weathered to leave isolated stacks. However, the overturned strata was not easily seen.

The next stop was at a disused clay pit of Santonian sandstone which is covered in places by about 4 metres of loess with palaeosols. Although well-known for fossils, only some small black plant remains were found at the base of the sandstone layers.

Geoparks are characterised by a particular geological heritage and can include sites of archaeological, ecological or historical importance. Since 2000 the Geoparks have been promoting geological conservation and geological tourism. The Geopark of Harz-Braunschweiger Land-Ostfalen covers the area of the tour. At the Geopark Infocentre in Quedlinburg we were fortunate to be welcomed by Dr George who explained how the Geoparks operate. With so many geologists from the UK a reporter from the local newspaper Mitteldeutsche Zeitung was sent to interview us.

Dr George then led the group on a tour of this most beautiful town of Quedlinberg, the old town of which is a UNESCO World Heritage site, with its over one hundred wooden-framed buildings. We then had free time so we were able to examine this very photogenic place and visit the castle on the hill.

Thursday 26 August

Schöningen Brown-coal Mine

This was the day for the lovers of large excavations, and it was unfortunate that the weather had broken spectacularly with heavy rain for much of the previous night, and bad ground conditions were anticipated.

Our first stop was at the viewpoint on the eastern flank of the active pit, where we were able to view the enormous pit and hear an overview of the geological setting, (from the head of the mine, Dr. Ueberschaar). As with Geiseltal, which we had seen earlier, salt tectonics were the key. Solution of deep salt strata during the Eocene caused subsidence and the development of thick lignite deposits as the vegetated swamps maintained their vertical equilibrium above the wasting Zechstein evaporites. Irregularities in that process resulted in the incursion of sands, gravels and clays which separate a dozen lignite seams, not all of which are of economic interest. Subsequently, the Zechstein evaporites rose en-masse along the centre of the basin to create a pair of synclines with their axes lying along the NW-SE Hercynian trend. Lignite has been won from the beds of both synclines during a long history of mining in the area, which straddles the erstwhile internal border. Mining is now concentrated in one pit, which is expected to be the last in the area, and will cease in 2017 at the end of the current contract when the mining is no longer considered economically viable. Production is about 2Mt per year, which goes directly to the Buschhaus power station where it is co-fired with domestic waste. At the headquarters of the mine, the party divided into the diehards who were prepared for the long walk and glissade into the pit, and those with more sense who continued into town for sightseeing.

At our lowest point in the mine we were at the level of the main bucket-wheel excavator, which was shut down for maintenance and reconfiguration of the conveyor belts that carry product and overburden to their separate destinations. The sheer bulk of this 1700t behemoth is difficult to express, but large hydraulic excavators were operating beneath its boom in order to shift some of its heavy components around.

The importance of the site for geological research arises from the complete succession in a terrestrial environment from the Main Seam which may be of uppermost Paleocene age to the Middle Eocene, which includes the Paleocene-Eocene Thermal Maximum.

Younger strata have been worked out here during earlier mining. There are no calcareous fossil remains due to dissolution in acidic groundwater, but rootlets and organic remains were well-displayed in seat-earths below the minor seams exposed higher in the succession. We were also able to examine a shallow marine interlude, as indicated by extensive development of the trace fossil Ophiomorpha. At the top of the pit we examined the development of very large silica-cemented concretions in the otherwise friable sands, similar to the sarsens with which some members are familiar.
These are common erratics and have been used extensively for walling, ornament and cobble-stones in nearby towns.

The party was reunited at lunchtime at the mine canteen, where we were made very welcome and enjoyed a satisfying lunch of wurst and potato salads. We are very grateful to E.ON Kraftwerke GMBH and the mine manager Hr. Ueberschaar for their hospitality.

Intermittent rain developed into a sustained downpour, so that instead of seeing the Schöningen archaeological site, famous for the oldest known spears, we were addressed indoors at the Town Hall by Dr. Jordi Serangeli on the subject of the archaeological investigations which have been in progress since 1982. A succession of glacial deposits of Saalian and Elsterian age overlie the Eocene strata of the lignite mine. Between them lies a record of a lake shore with abundant remains of fish, insects, seeds and pollen some 400,000 years old. Also preserved as a consequence of the normally high water table in the area is an internationally important site recording the hunting of horses by transient groups of hominins who left not only stone tools and fireplaces, but their famous ‘Schöningen Spears’ and the butchered remains of their quarry. No hominin remains are recorded from the site, which suggests that there was only seasonal occupation. The inference from the pattern of artefacts is that the hominins of the time were co-operative strategists who had knowledge of weaponry, group-hunting and fire and probably used language for communication. This remarkable excavation has only been possible as a result of the nearby lignite mine and its de-watering to a base that is 20m below sea level.

The domed Brockenhaus through the mist. Photo JC

The steam train to the Brocken Photo DL

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The steam train to the Brocken Photo DL

The domed Brockenhaus through the mist. Photo JC

Friday, 27th August
Harz Mountains and Brocken

The Harz mountains are classed as Mittelgebirge (medium-sized) in Germany, and their highest point, at 1141 metres is the Brocken, a massif of reddish biotite granite intruded about 300 million years ago in the Permo-Carboniferous Hercynian orogeny. It was de-roofed in Upper Cretaceous times [conglomerates of Upper Santonian age have been mapped around the granite] and the last of the Harz uplift occurred at this time, related to northerly pressure from the rising Alps.

Friday, the day booked for travelling up the Brocken by steam train...dawned wet and windy, with rain forecast all day. The train travelled past back gardens and the big Hassenrode brewery (whose beer we had been drinking). The engine had a more mournful whistle than UK steam trains, and we wound up through deciduous forest in a very narrow cutting. Then the trees thinned out as the track spiralled round to the summit station.

On the treeless summit plateau there are granite tors, such as the Teufelskansel (Devil’s Pulpit) and the Hexenaltar (Witches Altar) and an area of moorland - but all were hidden in the mist, wind and rain, so we went straight to the domed Brockenhaus, now a visitor centre and museum on four floors. Several floors dealt with the ecology and fossils from the surrounding Harz area. Here we were shown round by Dr Friedhart Knolle, who is a geologist with the Harz National Park.

Weather recording on the Brocken goes back 120 years. In 1934 the Nazis built a very early TV station here to relay the Berlin Olympic Games. During the GDR years the present domed building was used by the STASI as an East German secret service listening station.

Other floors dealt with the ecology and fossils from the surrounding area. Then it was back to Schöningen where the Burgomeister and Dr Jordi Serangeli met us in the Rathaus (Town Hall) for a reception, with press photographers present. The Burgomeister told us that fifteen million Euros had been allocated to build a museum and research centre - an Info-Centre - to include fossils from the brown coal including the “Schöningen Spears”, for research, and for publicity to bring visitors in to the region which has been dependent on brown coal mining. The mining is expected to finish within twenty years, so the spears finds were a "last gift from the brown coal". Volker told us that the climate history has also been studied, and fifty million years ago one could have seen the “palm beach of Schöningen”!

Alan Lord also spoke of how scientists need the help and support of local people, and co-operation is very good here.

John Crocker gave a vote of thanks, and all signed the ‘Golden Book’ recording our visit. We went outside to watch the opening of the Altstadtfest (Schöningen’s history goes back to before 800 AD), as the town band played and the Burgomeister opened the first beer cask to start the Fest.

Then back to the Burg, where they had provided a very good buffet supper [to compensate for the mix-up of some rooms on our arrival] with a free carafe of wine each; presentations of wine and votes of thanks by John Crocker to...
Day 2:

The leaders concluded an excellent day, despite the disappointing weather.

**Saturday August 28**

Our first venue on Saturday was Heeseberg. Here we were on a salt dome on top of the ridge which crossed the Harz Mountains. This had led to a shallowing of the sea and had allowed the growth of stromatolites. They are spectacularly displayed in quarry faces within the oolitic Rogenstein. We were able to examine the manner of their growth as they had been cut through vertically. It was this site which led Kalkowsky to first name them "stromatolites". The Rogenstein is in the Lower Bundsandstein formation. It has been used locally for paving and in houses. We passed by a tower, built in 1912, of Rogenstein in which stromatolites had been incorporated as decorative features.

After lunch we went to a quarry in the Upper Muschelkalk at Evessen. The Upper Muschelkalk is 8m. thick and is an important building stone. It is very fossiliferous and was deposited in a high energy environment. We were able to collect feverishly from this rich site including Hexengeld, witches money being crinoid ossicles. The Lower Muschelkalk was formed in a more restricted environment being sandwiched between two saline environments and thus has few fossils and these consist only of trace fossils.

Large erratics from a nearby sand quarry had been gathered together in a Findlingsgarten, an erratic garden, at Königslutter. They were labelled and some had been partly polished to allow close examination of their structure.

There was also a reconstruction of the ice age landscape which had led to their deposition so far from their Scandinavian origin. Most were magmatic, a few were sedimentary.

At a Geopunkt at Uhry we had a view over Upper Cretaceous - Lower Tertiary quartz sand workings. They were white, very pure fluvial deposits, perhaps reworked Triassic sandstones from the east used for glass and silic-on. On top are the glacial deposits from where the erratics came.

The field trip was a great success thanks to the careful preparation and presentation by our three leaders Dr. Volker Wilde, Dr. Silke Clasen and Professor Alan Lord as well as the many people who guided us down mines, through sites and museums and the many dignitaries who received us in their town halls.

Roger and Janet Brown
Elaine Bimpson
Jo and John Crocker
Margaret Dobson
David Greenwood
Linda Hamling
Deryck Laning
Johnatan Wilkins

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Stromatolite in quarry face at Heeseberg

Volker and stromatolite

1912 tower incorporating stromatolites as decorative features at Heeseberg

Collecting out of the Muschelkalk at Evessen

Erratic garden

Very white Lower Tertiary quartz sands.

Collecting at the carbonate iron ore workings in the Lower Jurassic at Rottorf
Rockwatch News

The final Rockwatch field trip of 2010 was to Shorncote Quarry in the Cotswolds; our thanks to Hill’s Aggregates for permission to visit the quarry. We had almost 50 people on the trip, possibly our biggest thus far! This is a favourite site for Rockwatchers and lots of Jurassic fossils were found, including brachiopods, gryphea and at least three of the large ammonite Macrocephalites macrocephalus, much to the delight of the children who found them, but their parents, who had to carry them to their cars, were not quite so thrilled! Sadly not much was found on the Ice Age gravels on this trip, apart from a beautiful Pliosaur tooth by one youngster on his first Rockwatch field trip! But, how did it get there? We made sure that the children realised that it was a very unlikely find from Ice Age deposits and challenged them to work out how it got there!

Our annual visit to the British Geological Survey in Edinburgh took place at the end of September for its Open Day. As ever, we had a really busy day with lots of visitors to the Rockwatch room, where they made their own fossils. It was a good mix of regularly returning visitors, Rockwatch members and people for whom it was a completely new experience.

The prize-giving ceremony for our Annual Competition took place at the end of the October half-term at the London offices of the competition sponsor, Anglo American Group Foundation. This year we had more entries than ever of an amazingly high standard, and, for the first time, awarded two Rockstars, such was the high standard of entries! Alec Walker’s copper sculpture of Anomalocaris and Freya Carter’s hand made felt crinoid, belemnite and ammonite fossils with accompanying information and activity books for each, were both superb entries and both youngsters very worthy recipients of the title Rockstar 2010.

Stuart McCracken, a minerals exploration geologist with Anglo American, gave a really interesting talk on “Rocks from the Andes” which highlighted some of the exciting work he’s done in South America. This talk, as well as the many others we have had the privilege of hearing from Anglo’s geologists over the years, was truly inspiring. Stuart and his colleagues always seem to hit just the right note to encourage and "wow" the children and their families about life as an exploration geologist. My guess is, that the excitement generated by these talks goes a long way to encouraging some of our prize winners to consider seriously geology as a career option. In fact, we are now beginning to see a number of former competition winners working as professional geologists!

After Stuart’s talk, Charlotte Edgeworth, Manager of Anglo American Group Foundation, presented the prizes and certificates to the winners and then had to immediately leave us to fly to South Africa for the Foundation. In fact, she actually delayed her departure so that she was able to do the presentations, for which we are hugely grateful. Sadly, this meant that she missed a magnificent lunch, which we were all able to enjoy! Everyone had a memorable day as the many “thank you” letters we have received indicate. Many thanks to our sponsor for their support for Rockwatch.

At the time of writing, we have two more events this year - a Family day at the Manchester Museum, focussing on the Jurassic and Dinosaurs on 11th December and a meeting with the Mineralogical Society at the Natural History Museum on 12th December. If you are looking for two great days out, do come and join us! Details on our web site www.rockwatch.org.uk

We look forward to seeing you.

Finally, I wish to express my thanks to all those people who so willingly help, in many different ways, to keep Rockwatch "on the road". Your help and support is invaluable and without you and your generosity, we would not be able to spread the fun and knowledge that Rockwatch gives to so many youngsters as far and wide as we now do. Thank you all.

Susan Brown
Chairman

Photograph credits,
Angela Tester, (Alex Bayley)
Susanna van Rose (Freya Carter & group at prizegiving)
Susan Brown - all the rest!

Two of Frey Carter’s books and felt fossils

Quilted wallpaper competition entry

Philip’s fossil collection - one of the competition entries

I’ve found a Macrocephalites macrocephalus

Prizewinners and Anglo staff
Recent Dorset RIGS activities.

You will be aware of some of the Dorset RIGS (DIGS) activities from a recent issue of the G.A. Magazine containing a review of the CD on the geology, landscape and stone industry of Purbeck (Volume 9 No. 2 June 2010 p.17). Dorset RIGS came into existence in 1993 and has designated over 60 sites of geological interest in Dorset. Most of the sites identified are inland, as it was considered that coastal sites generally do not need conservation activity and are well documented.

 Many of the designated sites are quarries or former quarries and, initially, conservation work was carried out on a number of these. The sites were designated following support from the land owners on the basis of their geological interest and educational value. As the years passed, the group did not manage to attract new members to any great extent and so it concentrated on educational activity and bringing the county’s geological interests to the attention of the public through leaflets setting out geological walks. One of these was generously supported by the Curry Fund of the G.A. (the Poxwell leaflet). A more ambitious project was the publication of two sets of leaflets, one for West Dorset and one for Purbeck supported by the Heritage Lottery Fund. All these publications are still available.

 Recently the group has attracted some energetic new members and much more conservation work is now taking place. We now have a regular monthly conservation day, and in September 2010 we got together with Wessex O.U.G.S. to continue some work at one of a group of sites at Todber (in north Dorset, north of Sturminster Newton), where there are a number of Corallian exposures in quarries (past and present).

 One of the sites (Birds Quarry) is owned by Hansons and we have had excellent cooperation from the manager. During a reconnaissance visit last February, the site looked very sad as no work had been done there for several years. Two conservation days later, the site was in excellent condition with the Todber Freestone and base of the *Trigonia clavellata* beds exposed.


What on Earth made the Surrey Hills?

Some 2,600 people attended Polesden Lacey’s recent Community Day where the Mole Valley Geological Society put on an exhibition explaining the formation of the Surrey Hills. A large collection of local fossils was on parade. Children were fascinated by the display of Dorking’s very own dinosaur, known to geologists as Baryonyx walkeri. Grown ups were introduced to the deep time during which the rocks of the Surrey Hills had been deposited, deformed and eroded to form the beautiful landscape that we enjoy today. The display also featured the natural resources of the Surrey Hills, including lime, sand, phosphate, clay, building stone, water, iron, fuller’s earth, oil and gas. This mineral wealth has been exploited by the inhabitants of the Surrey Hills for over 2000 years.

The typical clean oolitic limestone found at the site which is sparsely fossilsiferous. However some of the Corallian in this area can be very fossilsiferous and the nearby Marnhull quarry at Whiteways Hill (also a RIGS site) has some excellent fossils

This rock is the same age as the rock at Birds Quarry but shows how facies variation is reflected in the rocks in this area.

Alan Holiday
chairman Dorset RIGS
alanholiday@btinternet.com

Clare Hill
MVGS Press & Publicity Officer

Chas Cowie, MVGS Hon Sec., beside the exhibit awaiting the crowds.

Cross-section through the Surrey Hills illustrating their economic importance to the aboriginal inhabitants of the area © The Friends of Box Hill. From: 'The Box Hill & Mole Valley Book of Geology' by R C Selley 2006. Published by 'The Friends of Box Hill'.
CONTENTS
Compiled by Diana Clements
with contributions from Norman Coles,
John Cooper, Bryan Cozens, Peter Doyle,
Ramous Gallois, Jenny Hooker, Luke Martin,
Rory Mortimore, Danielle Schreve,
Jackie Skipper, Paul Sowan, Steve Tracey and
Christopher Wood

Introduction to the geology of the London area
1. The Colne Valley
2. Pinner Chalk Mines
3. The geology of London from Hampstead Heath
4. A geological walk around Trent Park
5. Disused Chalk pits and overlying Thames Gravels in East London
6. Charlton, Plumstead and Abbey Wood
7. Chislehurst Caves, Elmstead Woods and Sundridge Park
8. The 'Geological Illustrations' of Crystal Palace Park
9. Riddlesdown Chalk Quarry (formerly Rose & Crown) and Croham Hurst near Croydon
10. The Thames

BOOK REVIEW:
EARTH HERITAGE SUFFOLK

Subtitled Action for Suffolk's Geodiversity - A Handbook,
This new GeoSuffolk publication by Bob and Caroline Markham, is another step in the group's continuing efforts to
bridge the gap between geologists and the public at large. This
60-page A4 format publication is, to quote from the introduction,
aimed at providing supporting information to 'the providers and owners of geodiversity'.
Printed on good quality paper with well illustrated and uncluttered text, it has a professional feel and would sit comfortably
on the desk of a planner or consultant, although they might have benefited from a glossary of geological terms. But there
are also plenty of ideas for the average geologist or society member who wants to explore local geodiversity or find ways
of engaging with a wider audience.

The handbook is divided into six parts. It starts with a section that tells the story of Suffolk's geology and geomorphology
through a selection of 15 key geosites, nicely embracing the bedrock geology as well as landscape features and building stones. Part 2 deals with 'Protecting our Geodiversity'.
Key issues of site management and legislation is briefly but succinctly covered by a couple of site examples and the policies implemented by local authorities. Although a broad subject and impossible to cover in depth in a couple of pages, this section does introduce the reader to the complexities and issues surrounding the management of designated sites. The light-hearted note of the criticism received from one particular individual regarding geological time as 'pure invention' and evolution as 'fantasy' challenges our accepted viewpoint. It does bring home that not everybody looks at geology in the same light.

Part 3 looks at 'Promoting our Geodiversity' with examples from leaflets and display panels to access and education. GeoSuffolk has been particularly active in all these fields and some excellent examples of their work are reproduced in these pages. Part 4 is an interesting section in dealing with 'Inspiration'. Many of us will be familiar with the concept of 'Local Heroes' but GeoSuffolk take this a step further and look at geology in art and music, literature, textile design and historic trades. Part 5 comprises one page summaries of selected bodies (seven in total) that manage geological sites or collections, ranging from the national, such as the British Geological Survey and Natural England, to the local, such as Ipswich Museum and the Suffolk Wildlife Trust. With numerous illustrations, there is little space for much text but it gives a flavour of the support provided to protect and enhance geodiversity.

In conclusion, Part 6 lists a range of publicly accessible geological sites. With suggestions that include building stones, landscape features, fossil sites and museums there is probably something for everyone. The lists appear to include a relatively large number of sites for building stone (in churches, town streets, sea defences), but this probably reflects the limitations imposed on the sites being publicly accessible. For anybody interested in promoting geodiversity, whether through their local society or engaging with planning authorities or the like, this is a useful publication and would make an interesting template for similar handbooks for other counties. Earth Heritage Suffolk was published in June 2010 and is available from GeoSuffolk at Ipswich Museum, High Street, Ipswich IP1 3QH, priced £6.00, to include postage.

David Bone
WINNERS OF THE PHOTOGRAPHIC COMPETITION

First Prize - Southerdown Pavement - Malcolm Nugent

Second Prize - Finger of Cadomin Conglomerate, one of the Cretaceous rocks producing gas across the Rockies - Jon Noad

Third Prize - Geological Jigsaw Puzzle - Graham Hickman