Meetings June to October
Lost City of Suffolk
Oman Revisited
Visit to New Zealand
Fossil Fest 1
Barbados
Weekend Field Guides
Rockwatch
CONTENTS

3. The Association

4. GA Meetings
   June to October

7. Letter from the Presidents
   of GA and GS

10. Book Reviews

12. Mark Campbell in New Zealand

14. Pillow talk - Oman Revisited

16. Rockwatch

18. Weekend Field Guides


20. Dunwich, the geology of Suffolk's lost

Cover picture: The Wahiba Sands dune complex in Oman covers 15,000 km² see pages 14

Professor Allan Rogers

Honorary Vice Presidents:

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 of lectures, organises museum demonstrations, Proceedings and Guides, and conducts field meetings.

Annual Subscriptions for 2005 are £38.00, Associates £28.00, Joint Members £56.00, Students £16.00.

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

E-mail Geol.Assoc@btinternet.com

Telephone 020 7434 9298 Fax 020 7287 0280

Website: http://www.geologist.demon.co.uk

President: Robin Cocks

Executive Secretary: Sarah Stafford

Advertising Rates

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Full Page</td>
<td>£360</td>
<td>Half Page</td>
</tr>
<tr>
<td>Quarter Page</td>
<td>£100</td>
<td>Other sizes</td>
</tr>
</tbody>
</table>
REPORT FROM COUNCIL

This is the time of year when the Council expressed willingness to host a meeting at a venue that would be suitable for a large number of attendees. The venue was chosen to be held at the Burlington Hotel, and the decision was made to extend the meeting to include a celebration of the Association's 200th anniversary in 2007.

The nominations for next year's Council are now open, and nominations should be submitted to the General Meeting. Council also discussed the need for financial support and approved the new Rules of the Association, which are in a form which can be circulated to members for their approval at the Annual General Meeting.

FROM THE LIBRARIAN

First of all, I must thank one of our Members for the donation of an antiquarian book to the Library. This book, which had been donated some time ago, is now being reclassified and photographed for good photographs. A new edition of the standard BGS format with clear diagrams and photographs has been produced. The book is available for £35.00.

CURRY FUND REPORT

At the March meeting of the Curry Fund Committee, there were two applications deferred from the December meeting for £5000 towards the cost of a geological display at the Royal Botanic Gardens in Liverpool. One of these was awarded £1000 towards the cost of a geological display at the Royal Botanic Gardens in Liverpool.

The grants awarded at this meeting illustrate the range of geological initiatives that the Curry Fund is supporting. The Harrow and Hillingdon Geological Society applied for a grant towards the cost of putting a geological display in a local public library, and the GA was granted £1500 towards the cost of producing a booklet on the Dyke Swarms of Anglesey, and K RIGS was granted £500 towards the cost of producing a booklet on the Pyrenees. The GA was granted £1500 towards the cost of producing a booklet on the Pyrenees.
The exploration of Antarctic subglacial lakes

Martin J. Siegert
Bristol Glaciology Centre, School of Geographical Sciences, University of Bristol, Bristol BS8 1SS, UK.

Friday, June 3rd 2005
Geological Society, Burlington House, Piccadilly, W1V 0AJ
at 6.00 pm, tea at 5.30 pm

Over 140 liquid water lakes have been identified beneath the ice sheet of Antarctica (Figure 1). They were discovered by British glaciologists in the 1970s using ice penetrating radar to map the bed surface underneath the Antarctic ice sheet. In a number of places, they measured the base reflector to be unusually flat, smooth and bright (Figure 2). Such reflections can only come from the ice-water interface of a subglacial lake. The largest and most well known of these lakes is the 250 km long Lake Vostok. The majority of Antarctic subglacial lakes are much smaller, having lengths of around 10 km. All subglacial lakes are located beneath ice in excess of 3 km thick, and are likely to have depths of the order of 10s-100s of metres. Subglacial lakes are therefore significant bodies of water, isolated from the atmosphere for, possibly, millions of years.

Subglacial lakes research is underpinned by two hypotheses. The first is that subglacial lakes are densely populated by microbial life, and because the habitat is extreme and ancient, these microbes may be unique. To date, no direct measurements have been made in any subglacial lake. Such work is the only way to identify and understand life in these extreme environments. Instruments developed for the exploration of subglacial lakes are analogous to those needed to identify life in extraterrestrial bodies. (1) Life in subglacial lakes is likely to be sparse, and so identification of this life will be a significant challenge for instrument designers. (2) The instruments themselves will need to be miniaturised and operated remotely and fed information back to a distant receiver. (3) The Scientific Committee on Antarctic Research (SCAR) set up a group of specialists in 1999 to consider and recommend mechanisms for the international coordination of subglacial lake exploration programmes. They noted that the large size of Lake Vostok means that it will take decades to be characterised to a meaningful degree. A smaller subglacial lake could, however, be measured to an accurate level by a single dedicated field season. A UK-led proposal exists to survey a 10 km long lake in West Antarctica, named subglacial Lake Ellsworth. In a few years time, a
‘Evolution of the four-legged fish: new views of an early tetrapod icon’

Dr Jennifer A. Clack,
Reader in Vertebrate Palaeontology,
University Museum of Zoology,
Downing St.,
Cambridge CB2 3EJ, UK

Ichthyostega from the Late Devonian of East Greenland has stood as an icon representing a ‘transitional form’ between fish with fins and tetrapods with limbs and digits. For decades, it was the only known Devonian tetrapod, and remains one of the few for which articulated specimens have been discovered. However, new interpretations in the light of new information have thrown a very different light on this animal, showing it to be specialized, even bizarre, in many respects. This talk traces the evolution of ideas about Ichthyostega.

DUNWICH - Suffolk's lost city

Article by Roger Dixon
(See page 20)

Left: Part of the Medieval wall round the Greyfriars monastery site at Dunwich including an arched entrance

Above, a hind limb in which part and counterpart specimens have been superimposed photographically.

Below, a partially articulated specimen showing head, trunk and forelimb of Ichthyostega.
The Silverpit Crater, which has been described as the United Kingdom’s first impact structure, lies beneath 300-1500m of sediments approximately 140 km to the east of Scarborough in the southern North Sea. Best defined at top Upper Cretaceous level, the early Cenozoic ring structure consists largely of closely spaced concentric normal faults, up to 20 km in diameter. A cone-shaped uplift at Jurassic level beneath the structure possibly formed by collapse of the crater walls following the initial explosion. Detailed studies of seismic reflection data across the crater, computer simulations and preliminary reports of the discovery of impact-related material have provided subsequent support for an impact interpretation. Additional evidence may be obtained from recent hydrocarbon exploration wells in the area. The Silverpit Crater has already been added to global databases of impact features and is widely seen as a structural template for less well preserved impacts elsewhere.

Some puzzling aspects of the relationship between the Silverpit Crater and the geology of the southern North Sea have prompted other geologists to question whether it was formed by a random extra-terrestrial event. Firstly, regional structural maps and seismic sections show that the crater lies in the centre of a syncline formed by the displacement of a thick underlying layer of Permian salt, raising the possibility that the crater is associated in some way with salt tectonics. Secondly, if the crater is related to impact, then the collision must have occurred fortuitously during a Cenozoic tectonic episode in which similar nearby faults were already being formed. Thirdly, seismic interpretation has revealed that the location of the crater appears to coincide with pre-existing structural and stratigraphical features in the pre-Permian basement.

In this talk, all the various proposals for the origin of the Silverpit Crater will be reviewed, with the aid of seismic reflection data analogues and geological observations from a wide range of locations.
In 2007 the Geological Society will be two hundred and one hundred and fifty years old and in the following year the Geologists Association will be one hundred and fifty. It is thus opportune to review and hopefully consolidate the common ground between the two organisations, and we feel that the two of us as the current Presidents can speak with a united voice.

One thing that we are both certain about is that the two organisations are not competitors but natural allies. Both have geology in its widest sense at the centre of all their aims and activities. Both publish original scientific papers on all aspects of Earth Sciences and encourage more work in field and laboratory, and spread the word as far and wide as possible through a variety of activities. However, the two act in different but complementary ways to spread geological awareness and to raise the profile of the subject.

The Association is a friendly and symbiotic mix of both professionals and amateurs within its membership. As well as generating publications (the Proceedings, Magazine and Circular), it organises field excursions both in Britain and abroad, and has a network of Local and Affiliated Groups which also hold lecture meetings and field excursions. A particularly successful and popular GA activity is Rockwatch, which also has a magazine and holds meetings up and down the country to raise enthusiasm for geology amongst children. The Association is already closely linked with the Society in that the GA’s office is within the Society’s apartments and the GA monthly lectures are also held at Burlington House.

In contrast, the Society is at the heart of the geological profession, with appropriate validation of courses and professional certifications, and acts as a voice to government and other official bodies, as well as the media. In conjunction with the British Geological Survey, it initiates and acts for Britain in global geological initiatives and standing committees. Through its Publishing House it is the foremost geological publisher in Britain, publishing not only its own journals and also for various other learned societies, including the Proceedings of the Association. The specialist societies are at the heart of organising meetings in varied subdisciplines, and many of those, such as the Petroleum Group and the Engineering Group, contribute much to our national wealth.

It would be very good if more people were to be like ourselves, members of both organisations, perhaps like those with formal geological qualifications or with informal geology as a hobby. Both the Society and the Association are in the early stages of planning country-wide joint events to celebrate geology in 2007 and 2008 which should not only be fun but also help raise geological awareness within the wider community.

Robin Cocks and Peter Styles

OCTOBER MEETING (Continued)
Think of the Lesser Antilles and you think of a classical island arc, formed by volcanism at the edge of the Caribbean Plate. With Montserrat still fresh in the memory and the eruption of Mont Pelée on Martinique in 1902 the stuff of geological legends (Zebrowski, 2002), this is hardly surprising. With one notable exception, all of the principal islands of the Lesser Antilles had a volcanic origin. However, in this case, the exception proves a different rule.

You can see that there is something a little odd about Barbados just by opening the correct page of an atlas. From Grenada in the south to Dominica in the middle there is one arc; north of this point there is an old (Palaeogene) arc to the east which diverges from the Neogene arc to the west (for discussion of why, see Wadge, 1994). Barbados lies about 150 km east of St. Vincent. It is not part of the volcanic arc at all, but, rather, is a subaerial exposure of the top of the accretionary prism. As such, it represents a geological rarity indeed.

Yet, arriving on a flight into Barbados, the impression is one of limestone and more limestone. Ninety percent of the surface rock exposure is made up of three terraces of Pleistocene reef limestone, called the Upper (oldest, but topographically highest), Middle, and Lower (youngest) Coral Rock. The different elevations of these terraces have been the result of the interaction of oscillating sea levels during the Pleistocene at the same time as the accretionary prism was uplifted. Only where the coral rock has been eroded, in the so-called Scotland District to the north-east, are the underlying rocks of the accretionary prism sequence exposed.

Not surprisingly, it is in the Scotland District that the greatest geological diversity occurs, consisting of a basal complex punched through with mud diapirs and overlain by a sedimentary succession comprised of diverse siliciclastics. To give an example of just how diverse, Speed (2002, p. 58) lists rock and clast types from the diapiric melange of the Formation: very coarse- and fine-grained sandstone, mud matrix; green mudstone granules up to a few tens of meter; lithic blocks up to 25 m in diameter, including quartz sandstone with a calcite or bitumen cement, an indicative of an ancient cold seep community. Oil indicate the economic importance of this succession; products from the Woodbourne Oilfield in the southeast of the island complex beneath the Pleistocene limestones.

However, the Pleistocene coral rock succession is not just limestone. It includes shallow water limestones, with abundant foraminifera, but there are also deeper water fore-reef acted fossils such as brachiopods. The coral rock karst features such as caves and collapse structures. Local cliffs on the north and southeast coasts have been controlled by joint systems within the limestone. Cliffs, R. C. 2002, guide to the sub-Quaternary of Barbados, P. 58. Speed, R. C. 1994. The Lesser Antilles. In (Donovan, S.K. et al.) Caribbean Geology: An Introduction. University of the West Indies Press, Kingston, 167-177.


Above: Something of the structural complexity of the Tertiary succession of the Scotland District, as illustrated by the photograph. This contorted sedimentary sequence is part of the Palaeogene basal complex of the island.

Below: Donkeys in the sugar cane fields. Four ‘nodding donkeys’ extracting oil from the Woodbrook area, southeast Barbados.

FIELD MEETING - BARBADOS
The Geologists’ Association is arranging a field excursion to this beautiful Caribbean island led by Steve Donovan in early May 2006. Please see the June Circular for details, and contact Sarah Smith at the GA office for full particulars and booking forms.
BOOK REVIEWS

BASIN ANALYSIS
Principles and Applications
Philip A. Allen and John R. Allen
Second edition
Blackwell Publishing £37.50 Paperback
ISBN 0-632-05207-4

Study Phil and John’s magnificent book if you want to know all about plate tectonics and the processes which lead to the formation and sedimentation fill of basins. They tell you also how sediments evolve after burial and how hydrocarbons are formed and trapped.

Processes within the mantle and lithosphere drive plate motion; the consequent tectonics control basin formation and the catchment topography which is weathered and eroded to provide sediment for basin infill. An explanation of this constantly dynamic inter-relationship is the very heart of the book.

The physical state of the lithosphere determines how basins are initiated and evolve. Lithospheric stretching provides sag and rift basins; sag due to flexing on oceanic plates and rift basins on loaded continental plates. This chapter explains how thermal mechanisms determine the porosity and permeability of the rocks and displaces pore fluids due to compaction. Fluid movement responds to and modifies the porosity and permeability of organic material which generates oil and gas and depends on porosity and permeability. The ability of a rock to withstand increasing overpressure before fracturing and the chemistry which may allow cementation and consequent porosity loss are equally dynamic. On the contrary, warmer, wetter regions allow rapid weathering; in colder, dryer regions weathering is slow and shallow. These processes control the volume of erosion and sediment supply. Topography controls the direction of this influx of sediment to fill that space. Fluid movement and the generation of oil and gas are complex variations in depositional environments and time.

A Petroleum Play needs oil and gas generation from a source, and migration into porous and permeable reservoir rocks to form a trap sealed by a regional non-porous and impermeable sediment.

This classic multidisciplinary book addresses every discipline in detail. It shows you how to analyse specific geological data and make reasonable predictions concerning geology which exists away from your corporation. An understanding of the basin models, the dynamic processes which control motion and basin evolution, the weathering-erosion-sedimentation-burial-diagenesis system and the hydrocarbon generation process is essential for basin analysis.

SOIL EROSION AND CONSERVATION
R.P.C. Morgan, 2005
Blackwell publishing ISBN 1405117818 Paperback £29.95

Soil science is the poor relation of the Earth and Biological sciences. Sometimes soils are given coverage within these sciences and sometimes it is never guaranteed.

The same is true within the area of conservation. Biological science has had a large following for many years and geoscience has been in the background with the introduction of the term geodiversity and the public first book on the subject by Murray Gray in 2003 actually including valorising abiotic nature in the title. Neither guarantee to cover soil conservation.

Soil conservation has been left behind. It is the poor relative of air protection policies and quality standards too. The development of an aggregate levy sustainability fund with its emphasis on geodiversity conservation has the potential to help.

Soil is starting to get increased recognition due to a development in Europe (Soils and European Soil Strategy 2004). Thus it is timely running to its 3rd edition has been published.

The book with an international flavour but highlighting British soil erosion and conservation has had a large following in soil science. The need for soil conservation is justified in the first 6 chapters all aspects of soil erosion starting first with the actual science behind the subject. While to many the mathematics and formulae may be off-putting this is a necessary background and is minimalistic. The coverage dealing with detailed surveys at different levels is valuable.
Chapter 6 covers modelling the soil erosion system. This does not detract from the readability but all details of several different physically based models may be covered per page. Many of these matters and GUESS to EUROSEM and so includes European research and principles driven.

The core of the subject - Strategies for erosion control like to find with a quote from the last covered in Chapter 7. Here it is gratifying to see a full interdisciplinary subject. It requires, mining reclamation and urban areas covered. A fuller and more detailed geomorphological processes, agricultural approaches to soil conservation for cultivational and organisational society to design successful forestry. The following chapter deals with crop and vegetation management while the small Chapter 9 deals with soil management change public attitudes so that they will support concentrating on tillage.

Chapter 10 looks at mechanical methods of erosion control and has an interesting section on the use of geotextiles. The penultimate chapter looks at implementation of suitable protection measures, as this is the ultimate objective of research on soil erosion. Thus the wider context is discussed from legislative aspects to financial limitations. The last to the future. It highlights why soil conservation failed in the past and how a logical approach to this must be adopted. However it does stress that like extinction in the past and how a logical approach to framework analyses.

Many of the problems with this book are not the fault of the author but the publisher. Thus Boxes are rather small at less than 6 pages but the reference list is vast at 34 pages. Thus if you wish to follow up a topic on the book that is fine but if you wish to enter the field you may be unable to find your starting topic heading. Overall the typeface is rather small at less than 6 pages but the reference list is vast at 34 pages. Thus if you wish to follow up a topic on the book that is fine but if you wish to enter the field you may be unable to find your starting topic heading. Overall the typeface is small, which does detract from the readability but all details of several different physically based models may be covered per page. Many of these matters and GUESS to EUROSEM and so includes European research and principles driven.

The core of the subject - Strategies for erosion control like to find with a quote from the last covered in Chapter 7. Here it is gratifying to see a full interdisciplinary subject. It requires, mining reclamation and urban areas covered. A fuller and more detailed geomorphological processes, agricultural approaches to soil conservation for cultivational and organisational society to design successful forestry. The following chapter deals with crop and vegetation management while the small Chapter 9 deals with soil management change public attitudes so that they will support concentrating on tillage.

Chapter 10 looks at mechanical methods of erosion control and has an interesting section on the use of geotextiles. The penultimate chapter looks at implementation of suitable protection measures, as this is the ultimate objective of research on soil erosion. Thus the wider context is discussed from legislative aspects to financial limitations. The last to the future. It highlights why soil conservation failed in the past and how a logical approach to this must be adopted. However it does stress that like extinction in the past and how a logical approach to framework analyses.
I was fortunate enough to visit New Zealand, due to my "significant Other" being a Kiwi by birth and having had a long wish to go "down under." Though large parts of my several week lengthened trip were interrupted by visits to "in laws" etc., it was a great opportunity to explore what most geologists assume is a Mecca but are not sure of exactly why. Let me explode a few myths: The roads are wonderful and mostly empty, most people live in the worst parts of their magical land, and Rotorua was not the most interesting part.

What other immediate points come to mind? There is almost no Geoconservation/promotion to be seen anywhere, which points to the potential is clearly huge. However, a wonderful set up of "Reserves" all over both islands and "trails" that include some wonderful scenery and potential. The country is far more tropical and vegetated than the impression gained in Europe suggests. You don’t see sheep on the roads are littered with dead possums which is a damming species in New Zealand).

So what did my trip consist of? We began on the east coast - S. Island. This sits on the edge of the huge outwash plains from the Southern Alps and is made up of Pliocene-Pleistocene sediments. Adjoining it sits the Banks Peninsular which is basically the stumps of two large volcanoes of mainly Miocene age. These have been heavily eroded and provide some lovely sections through ash, scoria, basalt and andesite. There is also a bizarre quarry on the west side at Halswell which shows a curved planar jointing pattern which was exploited for paving slabs. Travelling over the southern Alps through Arthur’s Pass provided a superb way to view the two very different sides of the S.Island. The route up towards Lewis pass affords some stunning views especially of river terraces which are quite outstanding far better than any "text book" example. The magical moment as one passes the great divide/A where the Indian plate meets the Pacific plate. The west coast at Greymouth is quite simply stunning. Why no one lives here I understand. Some think its too wet!! Well it was very wet when we were there. The narrow coastal plain is broken by the Paparoa Range of Oligocene and Eocene sediments. These limestones, sandstones and coal measures make for scenery and lots of good sections. They also allow the strange karstic "Punakaiki Rocks", where the sea has made holes through limestones. The Pleistocene sands and gravel that surround these mountains are gold bearing and show the remains of past "gold rushes". What makes this area so special is the degree to which the native scrub and "bush" still drapes the land surface no matter how steep like a huge very thick vegetation is almost tropical and very dense with creeper everywhere. Crossing back through the Alps further north Lewis Pass affords another opportunity to see the juncture of the Indian/Pacific plate. This fault system is the Alpine fault. This fault has been thrusting the Australian Gondwana that split away from the Southern Alps and is made up of Pliocene sediments. The mountain ranges inland from Cape is wonderful and has a fine ophiolite sequence thrust up from a large mountain. The mountain ranges inland from the Rakaia river with spectacular terraces and Mt H made from Torlesse greywacke.
Rotorua is a predictable tourist honey pot. My advice is aim for geysers just away from the main town. Waimangu is a good one but we ran out of time to explore it fully. However, some lovely small steaming muds pools just off some of the roads if you go exploring and these to me were just as interesting!

Moving west there is perhaps some of the more cultivated and less interesting scenery in NZ. However, Auckland Harbour is impressive in an urbanised sort of way. North of Auckland you move into underlying Mesozoic (Torlesse) rocks punctured by modern volcanics and overlain by modern soft sediments. There is some wondrous coastal scenery and pockets of surprises such as the karstified limestone belt at Whangarei. What was disturbing was to see this being sold as broken lumps at the roadside for the usual ornamental purposes. The outcrops are small and precious and I hope the Dept. of Conservation wakes up to this soon!!

The coastline north of Auckland up towards Whangarei and Russell has some wonderful east coast beaches and rocky cliffs and huge longbeach strands on the west coast. However, the inland scenery is more muted in comparison with elsewhere in the county. There is a wonderful quarry that cuts almost right through a late Quaternary scoria cone. All the classic cone layering of ash, pumice, bombs and some lava can be seen and the adjacent lava field is easily seen in road cuttings etc. The coalfields are from the NZ Geological Society. There is also responsible for some nice waterfalls that show the lovely structures seen in lava flows. One of the spin offs is that the high area is good don’t expect GA standards!!!

Flow and high erosion rates has been there are numerous boulders general book by J. Thornton “A field guide” and Eocene coalfields (Kamo Coal Measures) and the “New Zealand Geology” which was a life saver but if you visit the surface. These are associated with mudstones, greenstones and conglomerates which indicate their patchy and marginal nature. As with all initial visits to a new geological area it is difficult to assess where best to go and afterwards you find many places that you should have gone.

So what advice would I give to any other “first timers”. Well maps and geological guides are very hard to find. Most places give you an amused smile when you ask! It is best to contact the IGNS (Geological Survey) who are at Lower Hutt near Wellington. Even then you can only get maps at 1:250,000 scale for the whole island and many of these are 40 yrs old. A new series is being produced but there is only about 30% coverage (Q map). There is one general book by J. Thornton “A field guide” and Eocene coalfields (Kamo Coal Measures) and the “New Zealand Geology” which was a life saver but if you visit the surface. These are associated with mudstones, greenstones and conglomerates which indicate their patchy and marginal nature. As with all initial visits to a new geological area it is difficult to assess where best to go and afterwards you find many places that you should have gone.

Fiordland. A few excursions made into the Alps to look at the metamorphic rocks and the metasomatised rocks in the Torlesse sequence are hard to find. My place is a North Island could be done by focussing on the east coast from East Cape and then cutting down through the main fault and the metamorphic zones in the Torlesse sequence (Geol Survey) who are at Lower Hutt near Wellington. Finally, the geologic zone at Rotorua and on to the big con

Ocean sediments trapped in subducted ophiolites. Whangarei Falls over compound basalt flows.
In February, 2003 seventeen Geologists Association travellers escaped from the snowstorms sweeping across Britain upon the first GA field excursion to Oman. Now there is a further opportunity to see something of the amazing geology of this beautiful Middle Eastern country on a special GA field trip in January, 2006. Our leader will be Dr. Omar Al-Ja aide, President of the Geological Society of Oman, who co-led the previous trip and has fully revised the itinerary.

So what will be seen? After a day studying the geology around Muscat, including a visit to the remarkable Sultan Quaboos Grand Mosque, participants will travel north along the Gulf of Oman coast to the Sohar area and then inland to Nizwa. We will continue south along the Oman Mountains and Wahiba before returning to Muscat. The journey is specially designed to include cultural and traditional aspects.

The rocks are dominated by the Oman ophiolite - a huge raft of Tethyan oceanic lithosphere with associated deep-sea sediments that has been pushed (obducted) some 400km over the pre-Permian continental shield and Permian-Cretaceous shelf carbonates. We will examine the ophiolite and its associated rocks, working through the entire sequence, from the mantle with its Harzburgites and Dunites, to the oceanic crust represented by extrusive pillow lavas and cherts. One of the highlights of the whole trip will be to stand astride the Moho at Wadi Abyad! Yet another is certainly the superb outcrop of Geotimes pillow lavas in Wadi Jizi.

Post-obduction deposits include Maastrichtian conglomerates, which have yielded dinosaur bone fragments, and Lower Tertiary shallow marine sediments (limestones and evaporites), which yield abundant nummulites and other foraminifera. Other locations visited will include such diverse geology as pre-Cambrian tillites, hot springs and the Jurassic-Cretaceous - something for everyone!

The rocks and structures we see will be discussed in the regional context of Middle Eastern plate movements and the opening and closing of the Tethys Ocean, including the concept of obduction - the implications of the process and how it happened. The economic importance of the country - and the region as a whole - will also be considered. Oman has great mineral wealth - copper has been mined since the Sumerian period some 5,000 years ago - and, in particular, great oil deposits. It is somewhat surprising to learn that much of the oil is from Pre-Cambrian source rocks!

The combination of mountains, rock formations and desert climate has led to the formation of some stunning landscapes, making this a very special part of the world. It is quite exciting to look down at Oman's Grand Canyon (especially if there is strong wind blowing) at the peak of Jebel Shams, the highest mountain in Oman. And to add even more excitement to the trip, a night can be spent under the stars among the seif and barchan dunes at Wahiba, which has its own unique Quaternary history, ecology and Bedu way of life.

It is difficult to believe that only 35 years ago Muscat was the world's smallest capital, with just 600 inhabitants and we will visit some of the country's historical and cultural sites at Nizwa and Jabrin, the beehive tombs of Jebel Misht (reputedly 5,000 years old), farms controlled by traditional falaj irrigation systems, and the dhow shipbuilding in the boatyards of Sur. An opportunity to see green turtles hauling themselves up the beach at Ras al Junayz to lay their eggs has also been arranged - a nocturnal experience not to be missed!
OMAN REVISITED


The Geologists Association has now arranged a field excursion to study the geology of this fascinating country, visit cultural and historical sites. The excursion, with revised itinerary, will be led by Dr. Omar Al-Jaaidi and colleagues from the Geological Society of Oman in 17th-29th January, 2006. Please contact Sarah Stafford at the GA office for full particulars and booking forms.

Above: The Moho at Wadi Abyad extends diagonally down the wadi side, separating darker, greener coloured mantle from orange-tinged crust.

Above right: The spectacular outcrop of Geotimes pillow lavas at Wadi Jizi.

Right: Oman’s Grand Canyon at Jebel Shams.
Winter weather is no deterrent to Rockwatch public where many Rockwatch events throughout the country as our recent events programme attests. The winter/spring events are part of our outreach programme where we encourage and enthuse the public about the far-reaching impacts of the Earth sciences on our daily lives and have fun with a range of Rockwatch activities to illustrate this at the same time. The Family Fun Day at the Sedgwick Museum in Cambridge attracted nearly 800 visitors and it was great to see so many Rockwatch members there. In addition, there was a mineralogy workshop at the Natural History Museum which was a great success, and for the first time, we had a mini-conference specially targeted at Rockwatchers and their parents, which was hugely successful. There were three talks by young scientists working at the university on earthquakes, climate change and palaeontology with time for questions, many of which proved quite challenging to the speakers! Our young Rockwatchers certainly knew their stuff. Rockwatch was on the road again in early March, this time to the Grosvenor Museum in Chester for a Family Fun Day which attracted lots of visitors including many Rockwatch members. The Jurassic dioramas and fossil replica making were firm favourites and shoppers in the busy Chester streets must have wondered at the vast number of scary, dinosaur filled boxes being carried home by excited youngsters! We also ran colouring games for younger children and local geology identification activities with colleagues from the Liverpool Geological Society. During National Science Week, Rockwatch joined the British Geological Survey (BGS) in Keyworth to run activities for almost 1000 schoolchildren and 100 of their teachers, ending the week with a Family Fun Day where children used the local paint to a fantastic Jurassic sea scene and children and activities on the beach. It was interesting to observe low-tech Rockwatch activities where whole families getting where children used the local paint to a fantastic Jurassic sea scene and children and activities on the beach. It was interesting to observe low-tech Rockwatch activities where whole families getting.
The pictures on this page, and the two on the back page, illustrate a few of the many splendid geological features of the Isle of Arran. Details of the geology are described in the Association’s Guide Number 32 (2000). An Island well worth numerous and repeated visits.

The pictures here and those on the back page were all taken by James Deighton - a member of Rockwatch who took them on a field trip to the Island. His report on the visit was a winning entry into the Young Writers Competition. His report runs to some 80 pages and includes some forty pictures a few of which are reproduced here. It reviews the whole of the geological history of the island, gives details of four itineraries and reviews igneous, sedimentary and metamorphic features encountered as well as features of the landscape and geomorphology. James has been a Rockwatch member for some five years, and has won the rock writer competition twice, and the over 16 category this year. At present, he is working on a level in Geography.

Below: Tertiary tholeiitic basalt dyke cutting Devonian conglomerates at North Glen Sannox, Arran. A fault has offset the dyke by some five metres.

Below: Ordovician pillow lavas exposed in the river bank at North Glen Sannox.

Below: King’s Cave, part of a Quaternary beach cut into Permian Sandstone North of Glen Sannox, Arran.
Making a case for the publication of short field guides capable of keeping people happy from, say, Friday to Sunday is fairly straight-forward and is undoubtedly feasible for most of the British Isles over the last forty or fifty years. Although most of our usually thicker detailed field guides, when suitably dissected to create additional day trips, can be suitably parsed to create a 2 or 3 day trip, this means that a more expensive guide has to be acquired, but then the appropriate information put together, a task probably requiring some prior knowledge of the ground to be visited. Most of us probably do not the inclination to do that and would prefer the job to be done by someone else. The time factor is, no doubt, also important when it comes to how much of it we can spare for such short visits.

There often appears to be a plethora of pamphlets covering short walks with geological and geomorphological content, but these tend to come to one's attention only when visiting a particular area. There are a relatively large number of pamphlets, booklets and other guides dealing with the world famous Dorset Coastal area, parts of Derbyshire and The Lake District, but elsewhere in the British Isles coverage is patchy. When you spot them in the local bookshops and newsagents they are usually quite cheap but tend to be of variable content and quality, some being very well produced with high quality accurate information and well-illustrated, others much less so. Some are produced for the casual holidaymaker or country walker pointing out and illustrating some of the main geological features along the route, commonly in a very attractive way. Others are more detailed and are more suitable for people already knowledgeable about certain aspects of geology.

The standard Geologists' Association field guides, so far can be said to belong to the second category carrying considerable technical detail about many excursions within a given area. The high quality of content suitable for all levels of our members is due to the dedication and expertise of willing authors, both amateur and professional, who are knowledgeable about the background of a wide range of geological features, including professional geologists. The guiding principle, if you will excuse the pun, is the concept of producing week-end guides is that they will allow a quick overview of fossiliferous Liassic strata, bone beds carrying gypsum veins and nodules, red beds with saltiferous Liassic strata, bone beds, and illustrating some of the main geological features along the route, carrying gypsum veins and nodules along the route, carrying gypsum veins and nodules as cheaply as possible, much less than our usual edition.

Needless to say the success of any proposed short guide depends on the availability of willing authors, both amateur and professional, who can perceive and know suitable areas where there is a distinct gap in guide literature that may have been to some locations, it may or more, postgraduates, undergraduates, school teachers, amateurs or disinterested parties from some other, have been to some locations, it may or more, postgraduates, undergraduates, school teachers, amateurs or disinterested parties from some other, have been to some locations, it may or more, postgraduates, undergraduates, school teachers, amateurs or disinterested parties from some other, have been to some locations, it may or more, postgraduates, undergraduates, school teachers, amateurs or disinterested party, or others have been to some locations, it may or more, postgraduates, undergraduates, school teachers, amateurs or disinterested parties from some other, have been to some locations, it may or more, postgraduates, undergraduates, school teachers, amateurs or disinterested parties from some other, have been to some locations, it may or more, postgraduates, undergraduates, school teachers, amateurs or disinterested parties from some other, have been to some locations, it may or more, postgraduates, undergraduates, school teachers, amateurs or disinterested parties from some other, have been to some locations, it may or more, postgraduates, undergraduates, school teachers, amateurs or disinterested parties from some other, have been to some locations, it may or more, postgraduates, undergraduates, school teachers, amateurs or disinterested parties from some other, have been to some locations, it may or more, postgraduates, undergraduates, school teachers, amateurs or disinterested parties from some other, have been to some locations, it may or more, postgraduates, undergraduates, school teachers, amateurs or disinterested parties from some other, have been to some locations, it may or more, postgraduates, undergraduates, school teachers, amateurs or disinterested parties from some other, have been to some locations, it may or more, postgraduates, undergraduates, school teachers, amateurs or disinterested parties from some other, have been to some locations, it may or more, postgraduates, undergraduates, school teachers, amateurs or disinterested parties from some other, have been to some locations, it may or more, postgraduates, undergraduates, school teachers, amateurs or disinterested parties from some other, have been to some locations, it may or more, postgraduates, undergraduates, school teachers, amateurs or disinterested parties from some other, have been to some locations, it may or more, postgraduates, undergraduates, school teachers, amateurs or disinterested parties from some other, have been to some locations, it may or more, postgraduates, undergraduates, school teachers, amateurs or disinterested party.

WEEKEND FIELD GUIDES
J. T. Greensmith

Folded and Faulted Liassic Clays, Helwell Bay, Watchet
DESERTS OF THE EARTH
Michael Martin

Thames & Hudson 2004
ISBN 0 500 511942 £35.00 (hardback)

At first glance this book is a book for the coffee table. It is produced in large format and principally comprises photos taken limited to some 15% of the whole. The world’s deserts. In his scene-setting section at the beginning Michael Martin, the book’s author and photographer, explains that the reader is the most that he spent nearly three years gathering and compiling material for this book. The book comprises 372 pages with nearly one third of the whole. The introduction sets out to define what a desert is and to describe the types of desert and why they occur. Successive chapters then describe the deserts of each continent; Asia, Australia, America and Africa. Each of these chapters comprises an overview followed by coverage of each desert area in that continent. The photographs examples of desert land and landscape, by Dr Ulrich Wernery on The Camel and the Desert and by Professor Stefan Dech on Desert Exploration from Southern Cyprus.

The introduction sets out to define what a desert is and to describe the types of desert and why they occur. Successive chapters then describe the deserts of each continent. The photographs examples of desert land and landscape, by Dr Ulrich Wernery on The Camel and the Desert and by Professor Stefan Dech on Desert Exploration from Southern Cyprus.

GEOLOGISTS ASSOCIATION
All the following are available in person or by post from
Geologists Association
Burlington House,
Piccadilly, London, W1J 0DU
All the prices shown include post and packing (Overseas add £1).
All the following are available in person or by post from
Geologists Association
Burlington House,
Piccadilly, London, W1J 0DU
At £13.00 (GA Members)
At £17.00 (Non-members)
2 The Lake District (1990)
22 Dorset Coast (1993)
At £11.00 (GA Members)
8 The Geology of Hadrian’s Wall (1997)
60 The Isle of Wight (1998)
19 West Cornwall (1994)
43 Costa Blanca (1990)
62 Lanzarote (2000)
64 D-Day Landings (2003)
63 East Midlands (2003)
41 Jersey (2003)
42 Mallorca (1990)
43 Costa Blanca (1990)
55 Early Cretaceous Environments of the Weald (1996)
46 Isle of Man (1993)
47 Coastal Landforms of West Dorset (1999)
At £15.00 (Non-members)
49 Tenerife (2003)
50 Southern Cyprus (1998)
55 Early Cretaceous Environments of the Weald (1996)
60 The Isle of Wight (1998)
54 Aberystwyth District (1995)
56 Castleton Area, Derbyshire (2000)
59 The Geology of Hadrian’s Wall (1997)
51 The Island of Bute (1995)
54 Aberystwyth District (1995)
10 North Cornwall, Bude to Tintagel (1998)
60 The Isle of Wight (1998)
59 The Geology of Hadrian’s Wall (1997)
61 Geology of the Western Front 1914-1918 (1998)
58 Advanced Geology of the Weald (1997)
52 The Geology of Hadrian’s Wall (1997)
67 The Island of Bute (1995)
59 The Geology of Hadrian’s Wall (1997)
61 Geology of the Western Front 1914-1918 (1998)
58 Advanced Geology of the Weald (1997)
52 The Geology of Hadrian’s Wall (1997)
67 The Island of Bute (1995)
59 The Geology of Hadrian’s Wall (1997)
61 Geology of the Western Front 1914-1918 (1998)
58 Advanced Geology of the Weald (1997)
52 The Geology of Hadrian’s Wall (1997)
67 The Island of Bute (1995)
59 The Geology of Hadrian’s Wall (1997)
61 Geology of the Western Front 1914-1918 (1998)
58 Advanced Geology of the Weald (1997)
52 The Geology of Hadrian’s Wall (1997)
67 The Island of Bute (1995)
59 The Geology of Hadrian’s Wall (1997)
61 Geology of the Western Front 1914-1918 (1998)
58 Advanced Geology of the Weald (1997)
52 The Geology of Hadrian’s Wall (1997)
67 The Island of Bute (1995)
59 The Geology of Hadrian’s Wall (1997)
61 Geology of the Western Front 1914-1918 (1998)
58 Advanced Geology of the Weald (1997)
52 The Geology of Hadrian’s Wall (1997)
67 The Island of Bute (1995)
59 The Geology of Hadrian’s Wall (1997)
61 Geology of the Western Front 1914-1918 (1998)
58 Advanced Geology of the Weald (1997)
52 The Geology of Hadrian’s Wall (1997)
67 The Island of Bute (1995)
59 The Geology of Hadrian’s Wall (1997)
61 Geology of the Western Front 1914-1918 (1998)
58 Advanced Geology of the Weald (1997)
52 The Geology of Hadrian’s Wall (1997)
67 The Island of Bute (1995)
59 The Geology of Hadrian’s Wall (1997)
61 Geology of the Western Front 1914-1918 (1998)
58 Advanced Geology of the Weald (1997)
52 The Geology of Hadrian’s Wall (1997)
67 The Island of Bute (1995)
59 The Geology of Hadrian’s Wall (1997)
61 Geology of the Western Front 1914-1918 (1998)
58 Advanced Geology of the Weald (1997)
52 The Geology of Hadrian’s Wall (1997)
67 The Island of Bute (1995)
59 The Geology of Hadrian’s Wall (1997)
61 Geology of the Western Front 1914-1918 (1998)
58 Advanced Geology of the Weald (1997)
52 The Geology of Hadrian’s Wall (1997)
67 The Island of Bute (1995)
59 The Geology of Hadrian’s Wall (1997)
61 Geology of the Western Front 1914-1918 (1998)
58 Advanced Geology of the Weald (1997)
52 The Geology of Hadrian’s Wall (1997)
67 The Island of Bute (1995)
59 The Geology of Hadrian’s Wall (1997)
61 Geology of the Western Front 1914-1918 (1998)
58 Advanced Geology of the Weald (1997)
52 The Geology of Hadrian’s Wall (1997)
67 The Island of Bute (1995)
59 The Geology of Hadrian’s Wall (1997)
61 Geology of the Western Front 1914-1918 (1998)
58 Advanced Geology of the Weald (1997)
52 The Geology of Hadrian’s Wall (1997)
67 The Island of Bute (1995)
59 The Geology of Hadrian’s Wall (1997)
61 Geology of the Western Front 1914-1918 (1998)
58 Advanced Geology of the Weald (1997)
52 The Geology of Hadrian’s Wall (1997)
67 The Island of Bute (1995)
59 The Geology of Hadrian’s Wall (1997)
61 Geology of the Western Front 1914-1918 (1998)
58 Advanced Geology of the Weald (1997)
52 The Geology of Hadrian’s Wall (1997)
67 The Island of Bute (1995)
59 The Geology of Hadrian’s Wall (1997)
61 Geology of the Western Front 1914-1918 (1998)
58 Advanced Geology of the Weald (1997)
52 The Geology of Hadrian’s Wall (1997)
67 The Island of Bute (1995)
DUNWICH

The geology of
Suffolk’s lost city

It is difficult to imagine, looking at the sleepy cluster of Victorian houses that are there now, just how dramatic the loss was. For standing on the cliff top, looking eastwards across the North Sea, all that remains of what once lay within the city walls is one gravesstone. The rest of the city has crumbled into the sea.

The Saxons had settled by the early 5th Century, making use of the natural sheltered harbour of the Dunwich estuary. St Felix arrived in 630 to bring Christianity to East Anglia, became the first bishop of Dunwich, so setting the trend for the establishment of religious foundations in the city, and died there.

By the early 12th Century Dunwich was the sixth town in England and one of the country’s most important, with a huge fleet of warships, fishing vessels and cargo vessels trading throughout Scandinavia and continental Europe. It had its own charter, mint and merchants guild, a preceptory of the Knights Templar and one of the first windmills in Britain.

Coastal processes destroyed all this. Erosion, even in the Domesday Book, has always been a problem. The cliffs of poorly consolidated sands and gravels of the Westleton Beds (Norwich Crag Series, 1.6Ma), coupled with violent easterly gales and longshore drift mean that the coast has retreated at an ever-age rate of 1m every year for at least 2000 years. Particularly severe were the storms of 1287 and 1328 - which together destroyed nearly a quarter of the city. The harbour had its own problems, frequently and ultimately becoming blocked by the growth of a shingle spit across the entrance. The city suffered. By 1400 over half the buildings had been lost, together with the merchants and industries, most of whom had moved away.

However, remnants of the city still survive. The Leper Chapel, previously a Saxon church, is all that remains of St. James Hospital, founded by Richard I at the end of the C12th and away from the city itself - the church ordered that lepers were not allowed to live in towns for fear of the disease, probably imported during the Crusades. The hospital was also used for the poor, sick and aged, and the last leper died in 1536. The chapel was last used in 1685.

The stylish Norman architecture can still be clearly seen, with fine carved Caen stone windows and arches. Of particular note, seen in the north wall and east end, is the fine decorative contrast between imported pale Caen limestone and large Septaria, some badly weathered, from the London Clay of south Suffolk. Elsewhere, beach flints and other materials are used, partly for restoration and conservation of the ruin.

One of two former monasteries, Greyfriars was built in seven acres just outside the city wall, completed in 1307 and was one of East Anglia’s most important Franciscan centres. The monastery was originally founded in 1228 on an earlier site which was severely damaged in a storm in 1287 and then lost. It became a ruin after the Dissolution in 1538 and masonry was carried off by builders for use elsewhere. Later buildings on the site used recycled stone and brick, but were mostly demolished before the monastery was enclosed by a high wall, using materials from churches and chapels threatened by the sea, with an arched entry gate on the Westleton Road. They contain flint, limestone, septaria and many of the exotics seen in St. James Church. However, part of the eastern section is almost entirely of blocks of Pliocene (3.6Ma) Coralline Crag, a soft sandy limestone from the Aldeburgh/Orford area to the south.

After nearly 60 years without a parish church, St. James Church was built on the site of the former leper hospital to a simplified-classical design by Robert Appleton.
Over 20 different types of building stone can be found in the chancel alone. They are mostly local flint with white Caen limestone around windows and doors. However, about one third of the roughly dressed stones used are exotics and include red, white granite, black dolerite, basalt and gabbro, white quartzites, gneiss, gritstone, several types of sandstone and limestone, chalk and others.

The same rock types can be seen in the other walls, Septaria are much in evidence (over 10% of the materials used) with round flint pebbles from the beach. Original Suffolk bricks can be seen in the tower.

Most of these building stones are recycled from the leper hospital and previous Dunwich buildings lost to the sea. Some, such as the Caen limestone, were imported from France during Norman times, and much stone was at that time ballast used by shipping.

A traditional locally made Suffolk pavement floor can be seen inside the church. In the south-east corner of the church stands the last buttress of All Saints Church, the last Dunwich's medieval parish churches. The final part of the church was lost to the sea in 1922, but the north-west buttress was saved and moved to its present site. Of note is the finely dressed chequerboard pattern of limestone and flint used in construction.

There is further evidence of Dunwich's origins and history to be seen in a gentle stroll around the village - the small museum has a splendid model of the old city. The cliff section will further appeal to geologists. And at the end of the long morning's walk, a plate of fish and chips washed down, of course, with tea, always be had in the café!

Thanks to a grant from English Nature, GeoSuffolk (Suffolk RIGS) has just published a new leaflet the geology of Suffolk's lost city to add to its series. It is available free to visitors at local Tourist Information Centres, libraries and museums.

Dunwich Forest was planted by the Forestry Commission in 1929
Minsmere bird sanctuary was created by the RSPB in 1948
Westwood Marshes is a National Nature Reserve
The National Trust acquired Dunwich Common in 1968
Fossil Fest I

Field Meeting

-New Latton Quarry

Saturday 5th March dawned cold and with the promise of more snow. However, despite the weather some 30 GA members convened in New Latton quarry on the edge of the Cotswold Water Park between Swindon and Cirencester. Fortunately apart from a few sleet showers the weather was relatively kind for most of the day. The meeting was organised by Dr Neville Hollingworth of NERC (now at the Centre for Ecology and Hydrology (CEH) Dorset) assisted by Jason Hilton of Birmingham University.

As those who attended his lecture on Callovian Calamari will know Nev is an expert on the geology of this area and first gave the party a brief introduction to the rocks exposed in the quarry. New Latton exploits Pleistocene gravels forming part of the Northmoor Terrace dated at 50,000 years bp. These were deposited during the last interglacial and a basal lag horizon yields remains of mammoth, bison and deer indicating a cool climate.

The floor of the quarry also exposes sections through the Middle Jurassic, Callovian, Kellaways Clay, Kellaways Sand and Lower Oxford Clay which dip at c.1.5° to the south. These are between 164.7 and 161.2 million years old (Gradstein et al 2004) and are richly fosssiferous with abundant ammonites, belemnites, bivalves and brachiopods. Fortunately Nev prevailed on one of the digger drivers to turn over some fresh material for us and after his talk the party dispersed around the quarry and very quickly found numerous well preserved specimens of Cadoceras, Proplanulites and Kepperites as well as ubiquitous Grypheas. A nice mammoth tooth was also found by John Evans.

Several members also visited a small gravelpit about ten minutes walk away which exposes gravels overlying Oxford Clay. However, apart from one large mammal tooth (?rhinoceros?) no finds were reported.

Towards the end of the afternoon the weather deteriorated and the party had to disperse but not before most had collected some very nice specimens. Our thanks to Nev and Jason for organising the meeting and to Cotswold Aggregates Ltd for permission to enter the pit.
In the Proceedings

In the following paragraphs, the Editor reviews forthcoming articles in the Proceedings of the Geologists Association.

The appearance of Presidential Addresses in the Proceedings is always most welcome (sadly, not all of them make the transition from oral communication to an article in our journal of record). William French has (by, I suspect, an heroic effort) found the time around editing and producing GA to write up his thoughts on Why concrete cracks: Geological factors in concrete failure. We are all familiar with concrete, it has literally been around since Roman times in Britain, holding together Hadrian’s Wall as well as innumerable castles and cathedrals from Norman times onwards which still stand. Modern portland cement was introduced in the mid-nineteenth century. Today, some 12 million tons of cement are used annually and underpin our modern construction industry. We are so familiar with it, that perhaps one no longer takes conscious notice of its near-ubiquitous presence - fence posts in the garden, motorway bridges, car parks, offices, schools, supermarkets and countless other buildings. However, will these modern constructions last as long as has Hadrian’s Wall? Perhaps not - only in the last few years has it been realised that particular types of stone which forms the aggregate, and which makes up the bulk of the concrete, can gradually react with the cement paste and only after some twenty to fifty years, depending on circumstances, do the results become evident: cracking and swelling of the concrete results, critically weakening, and perhaps even deforming, the structure. This article explains the geological and environmental factors which underlie this potential for major deterioration and what steps can be taken to avoid it. Next time you are stuck in a traffic-jam, with only the supports and underside of a concrete overpass to pass the time contemplating, this article will provide you with much food for thought.

A number of papers have appeared on the geology of the Channel Islands over the years. Edward Rose now provides us with an admirable account of The first hydrogeological and geological maps of Jersey, Channel Islands: work by Walter Kl pfel in 1942 and Richard Nelson c. 1928. Curiously, both maps, which the author has unearthed in archives in Britain and Germany, have their origins in military-geology. Lieutenant (later Major-General) Nelson was an officer in the Royal Engineers and Kl pfel was a military geologist during the occupation of the Channel islands in World War II. Nelson’s map appears to be the first truly geological map of the island. Kl pfel’s task was to view the geology through the prism of military requirements to aid the location of sites for gunemplacements, observation towers, storage points, and of sources of aggregate, sand and water for construction. Rose describes the backgrounds of these two men and the results of their endeavours.

On the occurrence of a mollusc fauna in the pebblebed from Mason’s Pit, Great Blakenham, Suffolk by Roger Dixon describes the first occurrence of an inmollusc fauna from that location at that horizon. The appearance of Field Reports in this issue is also welcome - Ian Williamson describes a meeting by the Lancashire group iower Kingsdale and Chapel-le-Dale, Ingleton, North West Yorkshire on 9 August 2003; Roger Dixon reports on the Coastal Suffolk Crag week-end 23-25 April 2004 and in Romney Marsh; its churches and geology John Potter describes a trip to inspect the building fabric of churches situated either on the marsh or its fringes. Tentative studies of the makeup of the building stones, with his knowledge of church architecture, help determine the sources and timing of the use of building in the area. All three trips have plenty to interest GA readers who wish to follow in the tracks of previous field parties.

Philip Commander provides us with a Review of 200 Years of British Hydrogeology (edited by J.D. Mather), a volume on the history of the provision of a vital resource - public water supplies - which, like concrete, one tends to take for granted. He describes the work of people such as William Smith, who first elucidated the principles of sinking; the engineer Robert Stephenson, whose expertise led the water-pumping engines; the London physician Snow, who first showed that diseases could be transmitted via contaminated well-water; Joseph Lucas, the first profession...
Above: View west of North Geln Sannox showing grey grits and schists in the foreground and granitance.

Below: An exposure on the North Sannox shore. A cornstone layer at the bottom is overlain by...