Buckinghamshire Geology Group

Newsletter No. 30 January 2018

News from the Committee
New Editor

After nine years and 29 newsletters, Graham Hickman has stood down as editor, left the county and followed the Jurassic limestone west towards Bath. I should point out, however, that Graham still intends to maintain contact with the Group, as illustrated by the planned trip in June to explore the geology around Bath.

I don't know how many newsletters I will edit but this is the first and we shall see how it goes. In future issues I would like to have regular articles focusing on different aspects of Bucks' geology, local sites, historic photographs and objects from the County Museum's geology collections. I am also keen to have more input from readers and would welcome contributions to members' Q & A articles or simply picking up on points raised in recent articles, such as 'What is oolitic limestone?'. Your thoughts, ideas and questions will be gratefully received.

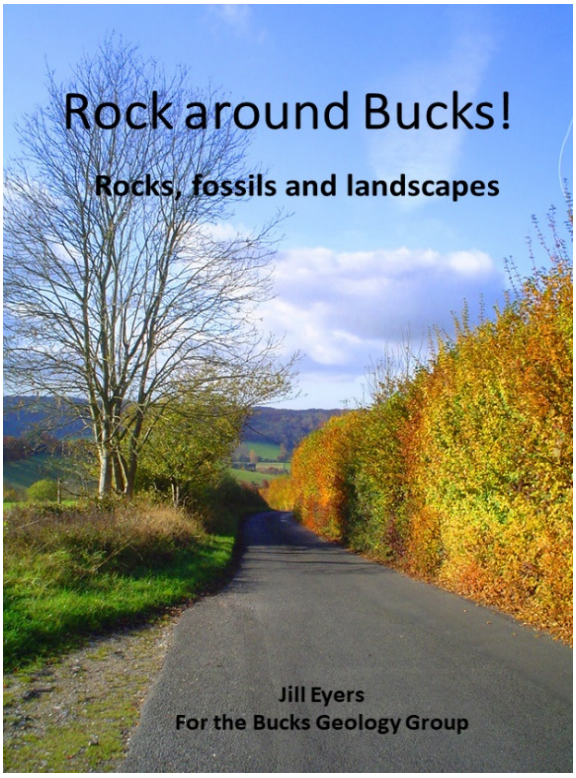
Mike Palmer

Coming Soon : Rock & Fossil Day at Bucks County Museum

Ammonite, *Rasenia* sp, Kimmeridge Clay

Saturday 17th February, 11am – 3pm. Discover fossils from the County Museum's collections, explore hands-on geology displays and bring in your own mystery items for identification. Entry to Museum by donation to support Bucks County Museum Trust

Rock around Bucks!
Book reprint for 2018



You may well have been aware of the book the Bucks Geology Group produced and have been selling for a few years now. Well – geology moves on swiftly and surely, and it is time for a re-vamp. The new book is almost finished and will be printed for publication around April this year.

The Bucks story is still there, as interesting as ever of course. But we have added new site information, lovely new photographs, more information on fossils and rocks to be found at the sites plus the correct terminology has now been inserted (names and eras have changed since the last publication).

The new book is more compact in size, but many more pages and in full colour. Details have yet to be firmed up but it is hoped to retail at less than £10.

Jill Eyers

From the Bucks County Museum's Collections

Two recent additions to the Museum collections

Firstly, a **Brachiopod with Serpulid worm** attached, found in Waddesdon churchyard. The Brachiopod has been identified by Mick Oates as *Torquirhynchia inconstans* and described as characteristic of the basal Kimmeridgian where, in Bucks, the Amptihill Clay meets the younger Kimmeridge Clay.

Brachiopods are marine invertebrates that have two protective shells (or valves). This gives them a superficial resemblance to bivalves (part of the mollusc group), however, the anatomy of the animal within is totally different with Brachiopods belonging to their own group. Bivalves usually have shells of similar size whereas in Brachiopods have one small shell and one large shell. You may also see a small hole at the top of the larger shell where a stalk (or pedicle) would have come through to attach the animal to the seabed when alive. Brachiopods are still living today but in nowhere near their former diversity.

Serpulids are marine worms that live on rocks and any other largely stationary object on the seabed including, as seen here, the shells of other animals. The fossil is the preservation of the protective calcium carbonate tubes that the serpulids lived in. Again, serpulids are still living today and modern-day tubes can be found on rocks and seashells washed up on the shore.

The second addition to the Museum's collections is a **dinosaur claw**. This claw was found on the northern edge of Aylesbury in 1996 and has since been on temporary loan to the Museum. However, at the end of 2017, the owner kindly offered the claw permanently to the collections. At the time of its discovery, American dinosaur expert, Jack Horner, happened to be in Britain and was able to confirm it as a dinosaur claw. A short, handwritten note from Jack simply reads *'Sauropod claw, probably a left, but I cannot tell whether it is from the front or hind leg'*.

Sauropods were plant-eating dinosaurs belonging to the group typified by what we all used to know as Brontosaurus but is now called Apatosaurus. Philip Powell, former Keeper of Geology at the Oxford University Museum of Natural History, wrote at the time *'all sauropod bones in this region are referred to as the genus Cetiosaurus, which is based on bones in this* [Oxford University] *museum… The only near complete skeleton of Cetiosaurus in existence is on display at the Leicester Museum but* [unfortunately] *it lacks its toes and claws'*.

Mick Oates notes that Jack Horner was the inspiration for the palaeontologist in Jurassic Park and technical advisor to Steven Spielberg during the film production.

Mike Palmer

Olney Building Stones Walk, *Saturday 27th May*

St Peter & Paul, Olney

With the AGM completed, ten members headed down the High Street in search of geology. The main reason for choosing Olney was to follow-up work of three people. In 1991, Gordon and Pat Osborn produced an article for the Milton Keynes Natural History Society journal entitled a *Survey of Rocks and Minerals Used as Memorials in Olney Churchyard.* Gordon was a long-standing Olney resident and a prominent member of both the Milton Keynes and the Northamptonshire Natural History Societies. After his death, his wife Pat published a related booklet, *Rock Hunting in Olney Churchyard*. Meanwhile, Dr Eric Robinson, a geologist at University College London in the 1970s was a pioneering force in the exploration of the built environment as a means of teaching geology. Amongst his numerous geological tours of towns and cities was a very small piece, *The Olney Wall Game* (1995) encouraging visitors to pick out features of geological interest in two sections of the wall of Olney church.

With these works in mind, we headed south along the High Street towards the Church. *En route*, the first observation was the large amount of limestone used in many of the buildings, especially the older ones. This is not surprising given that Olney stands on the Great Oolite Group (170-164ma), which here includes the clay-dominated Rutland Formation at its base, with Blisworth Limestone, Blisworth Clay/Forest Marble, and Cornbrash Formations at the top. (170-164ma). Historically, builders in Olney were served by numerous small quarries in the surrounding area, of which the pit at Weston Underwood is still active, producing good quality limestone from a small patch of Forest Marble facies.

Gordon and Pat Osborne, in their article, also mention the use of Lincolnshire limestone from the slightly older Inferior Oolite Group, noting how the oolitic nature of the latter produces a higher quality building stone than the more fossiliferous Great Oolite. Inferior and Great Oolite are terms over 200 year old, referring to the lower position of the “Inferior” and the relatively greater thickness of the “Great” Oolite in the western Cotswolds, where the divisions were first described. Particularly noticeable along the High Street was the definite pinkish hue to some to the limestone used, which seems to be a feature of the Blisworth Limestone at certain levels hereabouts.

Orchard House, No 69 High Street, is a particularly impressive building, and not only because of its architecture (Arts-and -Crafts Neo-Baroque according to Pevsner) but also the particularly colourful pillars of iron-rich Northampton Sand (170-174ma). Gordon Osborn notes that the main area of extraction for this was in the Duston and Harlstone vicinity, near Northampton. More examples of this stone were to be found in Olney Church Hall with some blocks including ironstone, possibly from the Middle Lias “Marlstone Rock”.

Orchard House, High Street, Olney

Finally, we reached the church and found the walls used by Eric Robinson in his *Olney Wall Game* to illustrate bedding and cross-bedding within the limestone, the fossiliferous nature of the rock and the degree of weathering to which some blocks have succumbed.

Exploring the churchyard with the help of the Osborns' article, we discovered weathered headstones of local limestone and Northampton Sand. Several large headstones made from Swithland Slate were also observed and showed how this harder metamorphic rock resisted weathering. Interestingly, the Swithland Slate outcrops at Bradgate Park, north of Leicester, and was visited by members on a field trip earlier in the year (see Newsletter No 29, August 2017). This slate dates back to the early Cambrian, 545 million years ago. Used since Roman times, the height of extraction would have been 1830 – 40 when it would have been transported south on the canals.

Re-reading the literature it is clear that there is still more to discover in this churchyard and so a re-visit may be on the cards.

Mike Palmer (with thanks to Mick Oates)

Walking the Ivinghoe Hills, *Saturday 7th October*

This walk never disappoints. The group set off from the National Trust car park and the views were spectacular! Walking along the well-trodden path up to Beacon Hill there is a really interesting mix of geographical features and wildlife.

The dry valleys and coombs are very obvious features along with the dip and scarp slope of the hills. Specialist plants and insects can be easily found and in warm pockets stray butterflies were still trying their best to fly.

Once up the steepest slope to the Beacon itself the archaeological story soon becomes clear. This is an amazing Iron Age hillfort. But the group started a discussion about what hillforts really were. This is an interesting topic now – as they are not always situated on hills and by no means all forts. Quite the opposite – most are not forts. So, this is quite a bad name in reality. The suggestions were that we should really be calling them 'Iron Age enclosures' as that much Is definitely true (although many, like Ivinghoe, do seem to have started in the Bronze Age!).

Jill brought plans of the site so features could be located on the ground as we spread out across the site. Wonderful to stand at the Iron Age 'gate' which is now imagined between a gap in the ramparts, and to see the pile of debris which was their rubbish pile!

The views from the Beacon across the Aylesbury Vale were amazing, despite being almost blown off the top of the hill! The view from the Cretaceous chalk under our feet took us out further across the Vale to older and older Jurassic rocks.

With a geological map in hand you can see the slight change in topography related to geological changes – especially notable is the mid-vale ridge of Jurassic limestone. This can be easily seen as it is harder than the softer clays either side of it, and the hills of Brill, Cuddington and Hartwell, along with others in the mid-Vale ridge can be seen clearly on a good day.

The walk took us back down the hill and across the road, past Grim's Ditch and onwards following the footpath to Incombe Hole. This spectacular dry valley is steep and shows the erosive power of water under tundra conditions.

Today the erosion continues in the form of slip and soil creep. Soil creep continues to form the tiny ledges seen in the valley sides – forming a little more each night in winter if the soil freezes. The website and the Rock Around Bucks book give full details of all these features.

The walk ended by returning to the cars and moving the few minutes down into Ivinghoe Village. The church shows local building stone – Chalk Rock, flint and Totternhoe Stone. In fact, it is located on a high point in the village which is due to the underlying Totternhoe Stone, which is a harder bed. There is so much history in the village that a whole walk could easily be done in the village alone – taking in everything from the Norman church through the medieval period to the Tudors, Georgians and Victorians. With archive photographs in hand we could put ourselves back in time to the very spot we were standing. Amazing how geology, history, geography, nature and archaeology all go hand in hand.

The group ended up in the tearooms in the old Victorian school for an excellent lunch. If you visit this at any time do look out for the 'Victorian

vandals' – the score marks in the bricks were made by Victorian children sharpening their metal pens for marking their slate boards in class. A really enjoyable day that we will definitely run again!

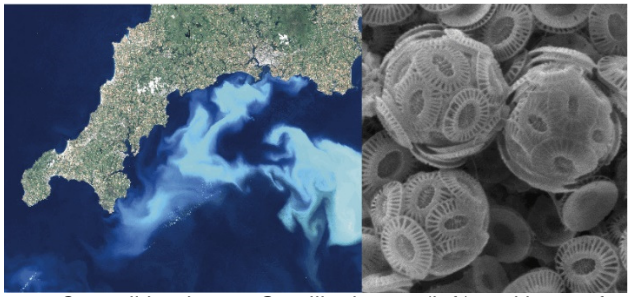
Jill Eyers

Talk: The Geology of the Chilterns and the Possible Impact of HS2,

Dr Haydon Bailey, Geological Advisor to the Chiltern Society, Saturday 11th November

48 people attended this joint talk with the Buckinghamshire Archaeological Society at the County Museum. Haydon began by taking us back 100 million years to the middle of the Cretaceous period. A time when unprecedented global warming had caused the polar ice caps to melt. The resulting rise in sea-level covered most of what would become Britain, with the area now occupied by Aylesbury estimated to have been 200m below the waves. This was the environment in which the chalk of the Chilterns was formed. But what is the chalk made of? The answer was a mix of all sorts of marine skeletal remains – bivalves, sponges, foraminifera – but primarily coccoliths, the tiny, calcareous plates of microscopic marine algae called Coccolithophores. A satellite image of south-west England was shown revealing an expansive white area in the sea to the south – a modern day bloom of coccolithophores.

However, this was as nothing compared to the unimaginably massive blooms that occurred



Coocolithophores: Satellite image (left) and image from scanning electron microscope (right)

during the second half of the Cretaceous, raining down on the seafloor for 35 million years to build up over 300m thickness of chalk.

The chalk of the Chilterns dates from 100 to 84 million years ago (the younger chalk strata having been lost to erosion). Haydon was keen to point out that 26 million years is a long time and that the chalk laid down over this time varied. An example of this can be seen in the case of the mystery of the disappearing

Misbourne. While the river is visible flowing south of Amersham as far as Quarrendon Mill, it then often disappears further downstream towards the Chalfonts. The New Pit Chalk Formation underlies the Misbourne near Amersham to Quarrendon Mill and is characterised by regular layers of marl (chalky clay) which reduces the porosity. Further on, however, it runs over the younger Lewis Nodular Chalk Formation. This stratum is defined by its hard layers and perforated structure arising from the extensive burrowing of marine creatures during its formation on the seabed 90 million years ago. The characteristic hardness of some of the layers within this formation also make it susceptible to fracturing and it is these that provide the main explanation for the river's disappearance.

Haydon described how the structural integrity of the geology here was further compromised by the early course of the Thames. Today, we take it for granted that the Thames heads south after Marlow towards Windsor and on through London but half a million years ago it flowed north-east towards Watford and on to Ipswich. This course can be traced by the Beaconsfield Gravels deposited by the Thames at the time. Then, 450,00 years ago, the Anglian ice sheet came south and blocked this route, sending it south on its modern-day course. Haydon's key point here was how the erosional power of the 'proto-Thames' and the effects of the freeze-thaw action of the ice age have further eroded and fractured the underlying chalk in the areas around Chalfonts.

Haydon's concerns for the impact of HS2 revolved around the proposed tunnel passing through this fractured geology, crossing the Misbourne near Chalfont St Giles were, in parts, there could be just a few metres thickness of un-weathered chalk between tunnel and more compromised and unconsolidated deposits above. Haydon stated that the potential for ground surface collapse cannot be ignored. The impact on the water-table and aquifer, supplying water to both London, Bucks and neighbouring counties was also raised. The Lewes Nodular Chalk and overlying Seaford Formation are the principle aquifer formations and so tunnelling here represents a real risk to polluting the aquifer and diminishing the water-table in an area of high demand and delicate habitats. At the close, an audience impressed and inquisitive audience asked many questions.

Mike Palmer

Talk: Mammoths in Britain, *Professor Adrian Lister of the Natural History Museum, Thursday 19th January 2017* *(article submitted too late for previous newsletter)*

A few years ago, a colleague introduced me to *Mammoths – Giants of the Ice Age,* written by Adrian Lister. A year later, Adrian visited the County Museum's stores to look at the mammoth fossils excavated from the former Pitstone Cement Works (now College Lake), Marsworth in the 1980s.

And so, when asked to find a speaker for the Buckinghamshire County Museum's Winter Lecture Series, Adrian was an obvious choice.

Adrian began by noting that while mammoths are related to modern-day elephants they represented a distinct evolutionary line. Seven million years ago the evolutionary lines for African and Indian Elephants split with a further division, two million years later, of the lines for the Indian Elephant and the mammoths.

The first of four species of mammoth to have lived in Britain, *Mammuthus rumanus*, appeared 2.6 million years ago and are represented by a few molars from the Red Crag deposits in Suffolk.

Fossil remains show that the Ancestral Mammoth, *Mammuthus meridionalis*, arrived in

Britain 2.5ma, just as the Ice Age was starting, and survived here until 700,000 years ago. Most British fossils have come from the Cromer Forest Beach Formation on the north coast of Norfolk.

800,000 years ago, the Steppe Mammoth, *Mammuthus trogontherii*, started to appear in Britain. This was the biggest of all mammoths, standing up to 4.3m at the shoulder – male African Elephants being 3.4m tall at the shoulder. Currently, the best, near-complete Steppe Mammoth in the world is that discovered at West Runton on the north Norfolk coast in 1990. It was thought that this species survived in Britain until 400,000 years ago, however, recent finds at Stanton Harcourt (Oxfordshire) and a re-evaluation of the 19th Century mammoth find at Ilford (London) suggest that they held on until 200,000 years ago, at a time when Woolly Mammoths, *Mammuthus primigenius*, were starting to appear in Britain.

Adrian pointed out the importance of the Lower Channel fossil finds from Marsworth for understanding this transition, where the evidence shows that towards the end of the Aveley Interglacial, 200,000 years ago, both Woolly and Steppe Mammoths briefly overlapped.

How do we know this? Adrian outlined how mammoth species could be identified from the number of enamel ridges on the biting surface of the molar teeth. Earlier species had ten to twelve ridges while the Steppe Mammoth around 19 and the Woolly Mammoth in the region of 25. This increase in ridges marks a change from animals feeding on trees to species (particularly Woolly Mammoths) feeding on grasses. Woolly Mammoths lived north of the tree-line on 'mammoth steppe', a cold, dry grassland with moss, ferns, flowers and occasional trees, a habitat that, like the mammoths, no longer exists today.

Studying dental micro-ware under a scanning electron microscope reveals that animals that feed on trees have lots of surface pitting on their molars while those feeding on grass have tiny scratch marks. This is due to the higher silica content in grasses and the greater amount of soil taken in by ground-level feeding.

Mammoth molar, Bucks County Museum

Adrian described how, after his first visit to the Bucks County Museum stores, he began to doubt his own evidence. However, a recent return showed the data to be right – the Marsworth molars show the presence of both Steppe and Woolly Mammoths in Bucks.

Adrian is currently working on a paper exploring the co-existence of Steppe and Woolly Mammoths. We look forward to its publication.

Mike Palmer

Fossil of the Year 2017

The German geological society "Paläontologische Gesellschaft" has awarded the title Fossil of the Year 2017 to the widespread fossil oyster *Pycnodonte* (*Phygraea*) *vesiculare*, on account, they claim, of its scientific and historical importance.

Anyone who has sought fossils in the local, Bucks Chalk will probably be familiar with this Upper Cretaceous oyster, only one of some 20

species in this genus which was extant since at least the Jurassic for a period of around 70 million years. Like most oysters, the shell varies in size, shape and thickness. They would have started life as free-swimming larvae, which needed to attach to something hard in order to begin their growth to maturity (this is why so many small ones are found attached to bigger shells or to hard surfaces within the chalk. Once they reached a decent size, they could lie recumbent on a soft seabed, somewhat like a boat, with the concave shell uppermost.

(*Pycnodonte* (*Phygraea*) *vesicularis* lived throughout the entire period of Chalk-deposition from Cenomanian to Maastrichtian Stages, or 100 to 66 million years ago) and has a wide distribution, from Europe to North and West Africa, South India and New Caledonia. Photographs below show a typical small Buckinghamshire specimen (from Pitstone) and a larger example (about 5cm across) viewed from the concave side (to give some idea of the variation) which I found about 7 years ago in the youngest Chalk, in NW Kazakhstan!

Mick Oates

2018 Future Programme

Cost: Unless otherwise stated all events are free to members and £3 for non-members

Booking: Where stated booking is essential to ensure that events are not over-booked and to allow leaders to contact would-be-attendees with any last minute changes

Saturday 17th February 2018, 11am to 3pm. Rock & Fossil Day, Bucks County Museum Church Street, Aylesbury, HP20 2QP: Explore hands-on geology displays, discover fossils from the Museum's collection and bring your own mystery objects. No need to book – just drop in. Entry to the County Museum is by donation to help support the Buckinghamshire County Museum Trust, registered charity 1153345. Contact Mike Palmer for further details, Tel; 01296 325223, email: mpalmer@buckscountymuseum.org

Sunday 4th March 2018, 10am to 12 noon. Discovering Minerals: A hands-on workshop exploring how mineral are formed and how to identify them led by Jill Eyers. Bucks County Museum Resource Centre, Halton. Places limited – Contact Jill Eyers for further information and to book a place - Tel: 01494 881325, email: j.eyers@btopenworld.com

Sunday 15th April 2018, 10am to 12 noon. Buckingham Sandpit. Contact Jill Eyers to book a place - Tel: 01494 881325, email: j.eyers@btopenworld.com. We are currently looking to organise a follow-on afternoon visit to Stowe Quarry and are awaiting relevant access permissions. Please check the programme on our website or contact Jill for further updates.

Saturday 12th May 2018. Bucks Geology Group AGM - location TBC, 1.00 – 1.30pm… followed by **Great Linford Geological Walk,** 1.45 – 3.45pm – exploring Great Linford quarry, stone circle, church, art centre and ending in the MK Parks Trust's Stonepit Field nature reserve. Contact Mike Palmer for further information and to book a place - email: mpalmer@buckscountymuseum.org – Tel: 01296 325223

Saturday 9th June 2018, 10am to 5pm. Exploring the Geology of Bath with Graham Hickman, looking at locations in and around Bath. For further information and to book a place contact Graham Hickman – Tel: 07763 363266, email: hickmagp@hal-pc.og

Saturday 28th July 2018, 10.30am – 3pm. Duns Tew Quarry Visit with Jill Eyers. For further information and to book a place contact Jill Eyers - Tel: 01494 881325, email: j.eyers@btopenworld.com

Saturday 11th August, 1.00 to 3.30pm. Pitstone Hill Circular Walk, exploring local geology and archaeology with Phil Clapham. For further information and to book a place contact Phil Clapham, email carolflip@talktalk.net

Saturday 8th September 2018, 9.45am (prompt) to 1pm. **Mundays Hill Quarry Visit** with Jill Eyers. For further details and to book a place contact Jill Eyers - Tel: 01494 881325, email: j.eyers@btopenworld.com
Sunday 21st October 2018, **Dorset Coast Geology Trip,** a joint meeting with the Reading Geological Society, led by Simon Penn of Wide Horizons Adventure Learning Charity. DETAILS TO BE CONFIRMED

Membership Reminder

Just a quick reminder that BGG subscriptions are now due for renewal. Annual membership runs from 1st January. Individual membership is £7.50 and Family membership is £12 per annum. Membership is open to beginners and experts alike.

With funding becoming harder to secure, we are ever more reliant on membership subscriptions to cover our basic costs such as Public Liability Insurance and website hosting costs.

A copy of the membership form is available on our website at www.bucksgeology.org.uk/how_to_join.html or on the reverse of this page

Please complete and return payment (cheques payable to BGG) to

Membership Secretary, Julia Carey, c/o BMERC, Place Service, 6th Floor, County Hall, Aylesbury, Bucks HP20 1UY (Email: jcarey@buckscc.gov.uk)

Alternatively, you can pay your subscription direct to the Buckinghamshire Geology Group account at: Lloyds TSB (White Hart Street, High Wycombe) Sort code: 30-94-28, Account no 00744003

Confirmation of receipt will be by email or by post.

The Buckinghamshire Geology Group aims to record, conserve and promote the geology of Buckinghamshire and Milton Keynes

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Website: *www.bucksgeology.org.uk*

For general enquiries please contact:

Mike Palmer, Tel: 01296 325223
email: mpalmer@buckscountymuseum.org
Bucks County Museum Resource Centre,
Rowborough Road, Tring Road, Halton,
Aylesbury, Bucks HP22 5PL

Affiliated to the Geologists' Association

Bucks Geology Group

Membership subscription due January 2018

Individual membership £7.50

INDIVIDUAL/PRINCIPLE MEMBER (Please use BLOCK CAPITALS):
In order to keep costs to a minimum, correspondence will be forwarded via email wherever possible.

TITLE: …… NAME: ……

ADDRESS: ……..

…… POSTCODE : ……

TELEPHONE: …… MOBILE: …….

EMAIL: ……

Family membership £12.00

2nd MEMBER – NAME:……

3rd MEMBER - NAME:……

4th MEMBER - NAME:……

I/We hereby apply for membership of the Bucks Geology Group

A cheque/PO for £……. is enclosed (**cheques payable to *BGG***)

Signature : …… Date : ……..

How did you hear about the BGG?……

Please send this completed form together with payment to:

BGG Membership Secretary:
Julia Carey, email: jcarey@buckscc.gov.uk
c/o BMERC.
Place Service 9th Floor,
County Hall,
Aylesbury.
Bucks. HP20 1UY

For general information about the Bucks Geology Group and for an up to date programme of events please visit:

www.bucksgeology.org.uk