

Buckinghamshire Geology Group

Newsletter No. 31 May 2018

From the Editor

Just another brief editorial to encourage contributions from the wider membership. The newsletter is the obvious place to report back on group meetings, talks and events. Also, as Keeper of Natural History and Geology I can always find plenty of things to write about from the 7,000 plus specimens in the County Museum's geology collection. However, I would, like the newsletter to also be about the members, about your interests and about your questions. I see the newsletter partly as a conversation – if you have read an article and have something to add, send it in. Equally, if any articles pose questions for you, send them in.

Why not write about what aspect of local geology you find interesting or, alternatively, pose questions for other members of the Group to answer. Found an unusual rock, mineral or fossil in or near Bucks? Take a photo and send it in. Visited a geological display in Bucks or within reach of the county? Why not write a review?

I look forward to hearing from you.

Mike Palmer

Events Update

Unfortunately, two of our early year events didn't run due to late publicity. Members, however, will get a second bite of the cherry. February's Discovering Minerals Workshop has been rescheduled for November (see programme), while April's visit to Buckingham Sandpit will be re-run as part of the 2019 programme.

We are now also running a return trip to Coombs Quarry on Sunday 24th June to have a clean-up and provide an opportunity to explore this premier Bucks site.

Mike Palmer

Rock & Fossil Day at Bucks County Museum, Saturday 17th February



People arriving early for Jill's ID table

With over 700 people attending, this was by far our most successful Rock & Fossil Day. Visitors were able to browse a wide range of local fossils including the Aylesbury dinosaur claw featured in the last newsletter. By happy coincidence the finder of the claw came along to the event for a chat. He was very pleased to see his generous donation on display to so many people.

Linda Holmes made a welcome return with a display of minerals from around the world.



Part of Linda's mineral display

Other attractions included our hands-on display of mystery geological items including a Jurassic fossil turtle shell spotted by the Museum's first curator, Edwin Hollis, in the walls of Hartwell

House in 1920 (more on this in a future issue). Children enjoyed the fossil sandpit dig, badgemaking and Jurassic Sea collage while children and adults alike, got up close and personal with the leg bones of a woolly mammoth and woolly rhino as part of the hands-on Ice Age mammals display.

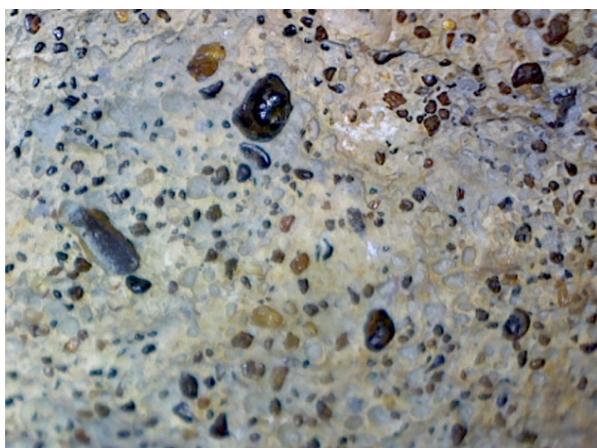
It was particularly nice to see so many visitors arriving with bags and boxes full of mystery geological items for identification - Jill was kept very busy on the ID table. Finally, a big thank you to all the members and friends of the Group who came along to help make it all happen. A difficult act to follow for next year but we'll give it a go.

Mike Palmer

Rock & Fossil Day at Bucks County Museum, Part 2.

From the ID table

Amongst the many items brought in to the Rock & Fossil Day identification table was this piece of limestone.



A limestone with this much clastic content is unusual. The grains are mostly rolled rock fragments of ironstone, chert and other durable rock. Quartz grains are there too. The clasts can be quite large – pebble size – but in this image up to 2 or 3 mm maximum.

It was lucky I was on the ID desk as it just so happens that the area this rock comes from was within my study area for my PhD! The visitor was most impressed when I ID'd it in two seconds! It is Shenley Limestone, a rare clastic limestone (Lower Cretaceous, Albian in Age) that forms in very small pockets within ironstone beds of the Lower Greensand. In fact,

the ironstone in question sits at the very top of the Lower Greensand – a unit called the Silty Beds. These are a tidal flat deposit. The ironstone is very likely to have formed within iron-enriched boggy water at the top of the tidal flats. Later, as sea-level rose, the ironstone became a wave cut platform with hollows and bumps just like those ironstones you see on the beaches of Yorkshire today.

Within cavities formed in the ironstone, organisms such as bryozoans started to attach and brachiopods and other forms of life took up residence. The carbonate gradually filled up the cavities, incorporating any remaining shells as fossils. The grit was washed in from the adjacent beach and nearshore zone.

The sea level rise that is shown at this horizon went on to be a substantial global warming with very high sea levels, culminating in our later chalk deposits.

A lot of story in a small piece of rock!

Jill Eyers

GeoWeek and a visit to Coombs Quarry, Saturday 5th May

GeoWeek is a nation-wide initiative aiming to encourage people to get involved in local geological field work and 'active geoscience' (as the event's webpage - see <http://www.bgs.ac.uk/geoweek/about.html>) puts it. In this, its first year, the event spanned a nine day week from 5th to 13th May. It is fair to say that GeoWeek crept up on us, some what, this year, however, we will be more prepared next time.

Despite the short notice, Jill Eyers managed to run a walk and site clean-up to tie in with the event. Through the power of Facebook, Jill met a group of 10 people at Thornborough Bridge carpark for a walk to Coombs Quarry, taking in both local geology and archaeology.

The walk set out to show how everything relies on geology! We looked first at the Romano-British burial mounds (the tumuli) and questioned why people settled there - water and good soil courtesy of geology. We looked at the location of the Roman farm and ridge and furrow from the Medieval manorial system. We laughed at the narrow size of the 14th century Thornborough Bridge which was the main road until the 1970s. Focusing on geology, we looked at the nice mix of building stones that make up the bridge

comprising a range of very different lithologies, including the local White Limestone.



Moving on to Coombs Quarry the assembled group cleared what vegetation they could with secateurs before exploring the rock faces and fossils. On a wonderful sunny day, visitors new to the quarry were amazed with the best quote of the day "I never knew Bucks was so interesting - wow!"

Jill Eyers

Fossil Explorer - Mobile Phone Application Review

In the last few years Smart phones have taken off and nearly everyone has taken up the technology. With the Smart Phone comes internet connectivity, GPS location and maps so you can navigate and work out where you are!

For the geologist one of the more useful applications I have found recently is "Fossil Explorer" published by the Natural History Museum" It is free to download and comes for android or iOS. The concept is simple. The phone uses the GPS to locate where you are. You can choose to display a geological map overlain on the street map and discovery what fossils might be found nearby.

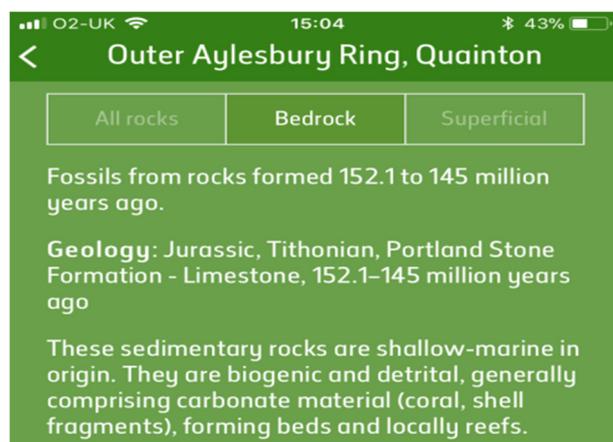
To show how it works. Let us say we are on a hill near Quainton, west of Aylesbury. The blue circle shows our location on part of the map shaded light orange. To get the map key and information on what this is we click the "Find fossils" arrow.



The next screen shows information about the rocks.

Portland Stone (152-145ma)

It also describes the deposition environment.



Then a further click shows what fossils you might find organized by fossil groups.



Bivalves (7)

Also called clams, bivalves are molluscs with two symmetrical shells (valves). They are very ...

Say we found a bivalve, we can expand the screens to see 7 common types of bivalves which can be found in Portland Stone.



We identify our find and click on the image for more information similar to that shown in NHM publications of British Mesozoic Fossils.



Fossil group: Bivalves
 Also called clams, bivalves are molluscs with two symmetrical shells (valves). They are very common fossils that vary a lot in shape and size. They occupy a wide variety of habitats and most are filter feeders. Familiar bivalves include scallops, oysters and mussels.

This is a great little application, think of it as having the NHM fossil books with you all the time.

Graham Hickman

Curators' Choice Exhibition, Part 1: The Marsworth lion jaw. Bucks County Museum, until Saturday 23rd June

Due to a gap in the County Museum's small exhibitions programme it was suggested by the new museum director that the curatorial team choose a small selection of items from each of their collections under the banner of Curators' Choice. The result is an exhibition comprising an eclectic array of sixteen individual items, artefacts and groupings from a pearly king and queen costume to Chalkhill Blue butterflies, from an Egyptian mummified cat to a Bronze Age sword. As Keeper of Natural History my choices also included items from the botanical and zoological collections meaning that I could only choose two geological items

My first geological choice for the Curator's Choice exhibition is the Marsworth lion jaw, an impressive piece of Ice Age evidence that also raises many questions.



It may come as a surprise to some visitors to the County Museum to discover that lions once roamed the Buckinghamshire countryside but that was certainly the case during the last warm interglacial period of the Ice Age 130,000 to 115,000 years ago. Quaternary scientists now refer to this as Marine Isotope Stage (MIS) 5e although it is still commonly referred to as the Ipswichian interglacial (in Britain). Deposits from this time, including those excavated during the construction of Trafalgar Square in the 1830s, have revealed fossils of hippos, hyaenas, and lions – animals more associated with Africa today.

In the 1970s fossil mammal bones including Hippo, Straight-tusked Elephant and Narrow-nosed Rhino were found in Ipswichian deposits from a buried river channel at Quarry 3 of the former Pitstone Cement Works, Marsworth – now College Lake Nature Reserve, although no lion fossils were found.

However, in the early 1980s, another, lower river channel was found in the quarry dating back to between 200,000 and 180,000 years ago as the Aveley Interglacial (MIS 7) was deteriorating in to another cold stage (MIS 6). In this more extensive excavation, bones from Woolly Mammoths and the more primitive Steppe Mammoths were found along with Brown Bear, Wolf, Horse and Lion. The latter finds show that Lions didn't mind if the climate was warm or more temperate as long as there were enough herbivores around to feed on. It is known from evidence from elsewhere that young mammoths were on the lions' menu. In all, 38 subfossil lion bones were excavated from Marsworth, of which the fragments of lower and upper jaws are the most impressive.



Was this Marsworth Lion the same species as lions found in Africa and Asia today? The first major write-up for the excavations, published in *Quaternary Science Reviews* 20 (2001) list these feline finds simply as Lion, *Panthera leo*, but sadly no further mention is made in the paper. Antony Sutcliffe's *On the tracks of Ice Age Mammals* (1985) devotes a lengthy paragraph to the finds at Marworth including brief reference to 'a lion of immense size'. With such brevity it is unclear as to whether this is or is not confirmation that the Marsworth Lion is a 200,000 year old version of the modern-day lion. Internet searches quickly lead us to mention of Cave Lions, these being either described as subspecies, *Panthera leo spelaea*, of the modern-day lion or, indeed, species in its own right, *Panthera spelaea*. Without access to the latest academic thinking it is difficult to conclude the Marsworth Lion's taxonomic status.

There is also conflicting information as to the size of these Lions with some sources describing animals as the same size as the modern-day lion while others suggest size 10 or even 20 per cent larger. Sutcliffe's mention of 'a lion of immense size' could refer to a much bigger animal or simply an animal at the upper

end of the normal size-range of modern-day lions.

With all this uncertainty I am not even going to ask the question 'Did cave lions live in caves?'. Rather, I will look to seek out relevant scientific papers and experts and report back.

Mike Palmer

Curators' Choice Exhibition, Part 2: Flint. Bucks County Museum, until Saturday 23rd June

My second choice was flint. This may seem an odd choice but I have been intrigued by what, on one hand, is a very familiar and every day object in the Chilterns and yet, on the other hand, manifests itself in so many interesting ways.



Somebody described flint as a rock with a sense of humour. This is largely due to the way in which it forms – silica precipitating out of water percolating through the chalky mud at the bottom of the Cretaceous seas, initially as a gel and then hardening over time to what we see today (*Mick Oates provides a more informative account of this in Newsletter No. 10 - July 2010 – see <http://www.bucksgeology.org.uk/newsletter.html>*).

Precipitation of silica is often triggered by the presence of some unconformity within the chalky mud, whether it be a dead sponge or an infilled shrimp burrow. As a result, it often takes on strange and weird shapes, forming around buried objects or replacing burrow in-fills. As a consequence, I have received many enquiries including ancient fossil skulls, fossil mushrooms and dinosaur claws, all, in fact, simply bits of flint looking like something they are not.



Enquiry brought in to the Museum as an ancient skull but really just a piece of flint with holes (sort of) in the right place to create the illusion of being something that it is not

Rattling flint nodules with dead sponges entombed inside and fossil sea urchins preserved in flint are also common items at the enquiry desk. Particularly nice specimens, and unfortunately less common, are pieces of flint containing minerals, from elaborate quartz crystals, to chalcedony (see Mick Oates' article below) and the plant-like dendrites made from magnesium oxide.



Magnesium oxide dendrite mineral deposit on flint (Bucks County Museum)

The exhibition case shows a selection of these. Let me know of any interesting pieces of flint you have found.

Mike Palmer

Flint and Chalcedony What's the Difference?

Flint has been known and used for millennia mainly for its utilitarian value. It shares its chemical formula with quartz, SiO_2 , or silica, with which it essentially differs in the size of its component crystals. Flint is the name given to chert nodules and bands that occur in the Upper Cretaceous Chalk (which they have partly replaced) and which consist of blocky microcrystalline silica, while the term quartz is generally applied to larger, macroscopic crystals or masses of pure crystalline silica.

There is another commonly-occurring form of silica, which turns up regularly in Buckinghamshire, also derived from the chalk, normally associated with flint. This is called Chalcedony and it differs from flint or chert in that its structure is microfibrillar, not blocky. Instead of growing into structureless masses like flint, or hexagonal crystals of quartz, Chalcedony forms as clusters of radiating rod-like crystals, almost too small to be resolved with a petrological microscope, but which manifest themselves as mamillated surfaces (smooth, rounded surface texture) where the mineral was allowed to grow naturally into a void (as illustrated below).



Chalcedony in flint nodule (Bucks County Museum)

It also differs visibly from flint by being quite translucent and will commonly fluoresce green or white under UV light. Masses of chalcedony are sometimes found within partially-formed flint nodules. In the illustrated example below, a 6cm-long sponge fossil preserved in a small flint nodule has been cut and polished. The central cavity of the sponge (the *Spongocoel*) is filled with semi-transparent chalcedony which has preserved much of its structure which it is now possible to examine to some depth, using a hand-lens.



Sponge fossil preserved in a flint nodule with central cavity filled with semi-transparent chalcedony

Other varieties of Chalcedony include the semi-precious stones, Onyx, Agate and Carnelian and it is the mineral responsible for the silicification of much fossil wood.

Mick Oates

While writing this article, Mick came across two photographs of Graham Hickman with an impressive specimen of chalcedony found at Whiteleaf Quarry during a Group visit in 2010



New Geology Displays at Bucks County Museum: What would you like to discover?

If you walk into Bucks County Museum, Aylesbury, the first area you are likely to come to is *Touch of Bucks*, the museum's permanent display gallery on the ground floor. This gallery was the product of a major museum refurbishment in the mid-1990s and has remained largely unchanged ever since.

Local geology is represented by a nice case of fossils from Kimmeridge Clays including examples from the Watermead Pliosaur. A life-size resin-replica of one of two large mammoth tusks excavated from Pitstone Cement Works in the early 1980s sits on top of drawers containing (or hiding) a selection of subfossil bones from our local Ice Age fauna including the impressive lower jaw from a 200,000 year old lion (when not on display in the temporary Curator's Choice exhibition). Next door, however, drawers labelled '*Some more Bucks fossils*' fail to connect with the majority of the visiting public. An obvious lack within the displays is any sort of graphic providing an overview of Buckinghamshire's geology by means of map, geological column and cross-section. So, while the displays are not without merit there is certainly room for improvement. And so, it was good to hear of Museum plans to seek funding to redevelop the permanent displays. As a prelude to this we are looking to develop a programme of reworking selected modules on an experimental basis to see what works and what doesn't.

Here, I think, the Group's members are perfectly placed to contribute ideas. Members with expertise in local geology can suggest what they think are the key points the museum's permanent geology displays should be conveying while those members looking to find out more about Buckinghamshire's geology can suggest things that they would like to discover from such displays. Above all, I would like any new geological displays to come about from the ideas of as many people as possible. If you know the Museum, then let me know what changes and additions we should make. If you don't know the Museum, call in sometime and let me know what you think is missing from the displays. I look forward to hearing from you.

Mike Palmer

Oolitic Limestone Formation

In the last edition of the newsletter the report for the building stones walk around Olney (27th May 2017) included mention of oolitic limestone. Here Mick Oates expands on its formation and occurrence.

Several sedimentary rocks are formed from small, rounded particles. A mature, sandstone is made from eroded, well-rounded quartz grains, some detrital limestones comprise accumulations of peloids (often faecal pellets) but this short story concerns **Oolite** – a limestone made from spherical grains (Ooids) that show a characteristic concentric lamination, shown in the photomicrograph (below).



The name is derived from the Greek word “oon”, meaning fish roe, which Oolite resembles. Each grain has at its core a minute particle of sand or shell, around which successive layers of limestone have accumulated as the grain has tumbled around in agitated water, for example a tropical intertidal zone.

Nowadays, ooids form in warm shallow seawater, and the popular beaches of the Bahamas (photo below) and Dubai are good examples.



They are well rounded and polished as a result of the constant wave movement and form preferentially in warmer conditions, where the sea-water cannot contain so much carbon dioxide, which is consequently encouraged to combine with calcium in the sea-water to precipitate out as calcium carbonate (calcite or aragonite). The modern consensus is that ooids form without any biological intervention, purely from the precipitation of calcium carbonate from sea-water onto the grains. However, another mechanism, involving a thin algal coating capturing and fixing lime mud in accretionary layers has been suggested, and the solution is still in debate. Oolite rock more frequently than not occurs without much fine-grained matrix, as this would have been removed and swept away by the current energy in the water.

Once formed, below the sea-floor, circulating formation water rich in dissolved calcite soon cements the grains together, forming the limestone, “Oolite”.

Most people associate Bath Stone and the Cotswold Oolites with attractive yellow to cream buildings. However, this is only the colour at the surface, where millennia of exposure to oxygen have weathered the stone to this colour from its original hue, which was grey.



The example (below), from a sub-surface core in Middle Jurassic Oolite, shows this transition in progress at about 25m depth, along a fissure plane.

In the UK, oolitic limestone is found in strata of many ages, but perhaps the best known are the Inferior and Great Oolite Groups of the Cotswolds and Lincolnshire. In Buckinghamshire, Oolite is not at all common, occurring infrequently in the Middle Jurassic limestone formations in the north of the county. The reason for this is that the Middle Jurassic

environments in our area were farther from the open sea, and with only weak wave activity, agitation of the water was slight and more lime-mud could be deposited. What might at first appear to be oolitic limestone can, upon closer examination prove to be made of peloids (pellets) devoid of internal structure.

Mick Oates

Geological Grave Goods in an Anglo-Saxon Burial

Earlier this year, a County Museum volunteer cataloguing archaeological archives at Bucks County Museum Resource Centre came across some unexpected geology. The particular archive in question was of material found in a mid-Saxon cemetery excavated in Wolverton in 2007.

One grave contained the skeleton with an assortment of geological specimens found at the feet.



A group of fossils included three echinoids, a sponge, two flint nodules, serpulid worms, an ammonite and an unusual bivalve. The Museum's database entry also records a piece of 'bright orange amber' and 'curious stones, including four possible sling-stones and a lovely banded stone'. None of these items are local to the burial site and so didn't find their way from the surrounding sediments. Rather, they were placed in the burial deliberately, presumably because they had some meaning, possibly because they were collected and/or owned by the person.

A full write-up of the excavations will appear in a future edition of *Records of Bucks*, published by

the Buckinghamshire Archaeological Society (see <http://www.bucksas.org.uk/> for more information).

It would be interesting to discover how common or uncommon it is to find deliberately collected / placed geological specimens in historic and prehistoric burials. I only know of one (see next issue).

Mike Palmer

Members Questions: Coombes and Channels

Coombes have been described (taking Incombe Hole as an example) as depressions on the escarpment caused by erosion and solifluction processes in the Ice Age. However, there is also another prominent feature to be seen from the top of the hill – channels. These are long banks of material that appear mark the margins of the coombe aprons (or fans).

The most prominent of these runs down to the Icknield Way below (others may have been obliterated by the quarry workings). It may have continued past the road but unfortunately a shallow quarry has erased any trace of it – but presumably it would have headed in the direction of Pitstone village.

My questions are: -

Were there more of these long bands running down Pitstone Hill (and other hills on the escarpment) and what do they represent?

Are they the edges of coombes and composed of chalk that resisted erosional forces or do they represent a different kind of run-off and down flow?

If so, have they ever been investigated by geologists?

Phil Clapham

Next Newsletter due August 2018

If you have any articles that you would like to write, have anything that you would like to add to articles in this newsletter or would simply like to ask fellow geological enthusiasts a question about Buckinghamshire's geology, please let me know at mpalmer@buckscountymuseum.org

Mike Palmer

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

Sunday 24th June 2018, 2 to 4pm. Coombs Quarry Visit and Clean-up with Jill Eyers. For further information and to book a place contact Jill Eyers at j.eyers@btopenworld.com

Sunday 29th July 2018, 10.30am to 3pm Duns Tew Quarry Visit with Jill Eyers. Start and finish times to be confirmed. For further information and to book a place contact Jill Eyers at 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 information and to book a place contact Jill Eyers at 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**

Saturday 10th November 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 – For further information and to book a place contact Jill Eyers at j.eyers@btopenworld.com

Membership

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.

A copy of the membership form is available on our website. Please complete and return payment 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

Website: www.bucksgeology.org.uk

For general enquiries please contact

Mike Palmer

*Bucks County Museum Resource Centre
Rowborough Road, off Tring Road, Halton, Bucks HP22 5PL*

Tel: 01296 325223 email: mpalmer@buckscountymuseum.org