Geology Matters

The newsletter of Malvern U3A geology group
June 2016

The leader

The final indoor meeting of this U3A year proved to be both varied and interesting. Many thanks to Alan Gray for his excellent talk on the recent trip to the Azores and to Mary Geffen for her 'Rock of the Month' talk. Mary's talk was a trial to see whether it might work as a regular feature of our indoor meetings. The demonstration of our new microscope viewers showed encouraging interest and a number of members asked if we could run some basic microscope use sessions. Dick Harris has volunteered to do this, so if anyone is interested in bringing along some specimens and learning how to use the equipment, please contact him.

The final part of the meeting was a feedback session intended to get ideas from group members for improvements to the running of the group. There were a number of useful suggestions, which we will be considering:

- Rock of the month – following Mary's talk, the consensus was that we should continue with the idea of a short, sharp talk given by a volunteer member.
- Let's have a Christmas party!
- Introduce a calendar section in the newsletter – see new section below.
- New Members sessions – strong support to continue these in October.
- Re-running some of the earlier UK residential trips; eg Jurassic coast.
- Short walks/trips to cater for our less active members.

Since the May newsletter, the first 2 of our summer trips have taken place. The trip to the Darren's proved a great success thanks to Alan Hughes the organiser and Dick Bryant and Moira Jenkins who provided the detailed expertise. The second trip was a walk to look at the building stones of Malvern lead by Kate Andrew and a practical follow up to her recent talk on the EHT Building Stones Project.

Calling notices for 3 upcoming trips are attached to this email – see Calendar section below. As always the numbers are limited, so book your place in good time.

Attached is a copy of the 2016 Geofest programme run by the Abberley & Malvern Hills Geopark. The programme includes activities at all levels from June until August. One event that didn't make the printed programme but

might be of interest to members is a guided walk by Paul Olver in the Longhope to May Hill area which will include visits to the Huntley and the Hobbs quarries. Booking details are not yet available but we will circulate them when we know them.

Oh! I do like to be beside the seaside

But whether there are any brass bands here is a moot point. We are looking at Hopewell Rocks in the Bay of Fundy, which the well travelled among you will recognise as being in Nova Scotia, Canada. The Bay is renowned for having the greatest tidal range in the world – a remarkable 15 metres; contrast this with many areas of the Mediterranean with a tidal range of just a few centimetres.

The incoming tides are sediment laden and coupled with wave action have a very erosive effect, which we can clearly see in the photograph. The rocks are sedimentary and were deposited about 600 million years ago as the mountains of the Caledonian Orogeny eroded. The Bay area has a very varied collection of rocks, minerals and fossils and would certainly be worth a visit if you were in the area.

http://www.bayoffundy.com/about/geology/

From sea level to 86 metres below it, oh and 5500 km further on

In fact to keep up the North American theme, this next article is about Death Valley in California. Death Valley is one of the best geological examples of a basin and range configuration. The valley is bisected by a right lateral strike slip fault system, represented by the Death Valley Fault and the Furnace Creek Fault. The Amargosa River flows through the valley but eventually disappears into the sands of the valley floor.

Death Valley also contains salt pans. According to current geological consensus, at various times during the middle of the Pleistocene era, inland lakes (collectively referred to as Lake Manly) formed in Death Valley. Lake Manly received water overflowing from a chain of other Pleistocene lakes, most of which are now also dry lakebeds. As the area turned to desert, the water evaporated, leaving an abundance of evaporites such as common sodium salts and borax, which were later exploited from 1883 to 1907.
As well as being a very hot region, it also hosts a rather weird phenomenon -

the sailing rocks. Rocks weighing tens of kilograms move across this lake bed and leave clear trails, sometimes hundreds of metres long. The explanations included alien control and hoaxers, but recent research has shown that under certain winter conditions, enough water and ice could form to "float" the rocks across the muddy bottom of Racetrack Playa in a light breeze, leaving a trail in the mud as the rocks moved.

Since 'evaporites' are mentioned above, it didn't seem unreasonable to continue that branch of this wandering theme

Rock of the month

Just in case you didn't know, Margaret Rodway has the finest collection of rocks in our Group and almost certainly in Malvern too. You can also judge her expertise by the following article.

Gypsum, $CaSO_4.2H_2O$, is the most common sulphate mineral and is the reference species for 2 on the Mohs hardness scale (it can be scratched by a fingernail). It is found as granular material (alabaster), parallel fibres (satin spar) and as white, coloured or transparent crystals (selenite).

Satin spar

Maria glass

When it is in large slabs and transparent it is known as Maria-glass, and was used as window glass in mediaeval times. Alabaster is used for decorative carvings. Selenite crystals come in several forms, some of which are brown radiating crystals called daisy-bed gypsum; large monoclinic crystals which are often twinned (fishtail gypsum) elongated crystals which can vary from

Fishtail gypsum

Desert rose

being needle-like to giant sizes (12m x1m, found in caves in Chihuahua, Mexico) and 'desert roses' which are petal-like clusters or flattened crystals that are usually found in arid sandy conditions such as shallow salt basins. When seawater evaporates, dissolved minerals begin to precipitate in the order of least solubility, so that calcium carbonate comes out of solution first, forming limestones such as oolite. Gypsum precipitates next and common

Rock salt (sodium chloride)

Gypsum

salt, NaCl, third, often forming huge deposits because seawater contains enormous amounts of it. These two are known as evaporite minerals and are forming today in shallow seas within 35º latitude of the equator, e.g. the sabkhas on the Arabian coast. Gypsum is also found in small quantities in volcanic areas where sulphuric acid fumes have reacted with limestone, and in veins where sulphuric acid produced by the oxidation of pyrite has reacted with calcareous wall rocks.

In the geological record we find evaporite deposits which are tens or hundreds of metres thick as in the Permian strata (250 Ma) of NE England and Triassic rocks (200 Ma) in Cheshire which provide the winter salt for our roads. A relatively local place to find gypsum is the Aust Cliffs near the old Severn Bridge where you can pick up alabaster which formed in veins, and small crystals amongst the shales.

Gypsum's chief use is in plaster and cement, and it is fire-resistant as it contains water which is driven off by heat. We're all acquainted with the dehydrated form, plaster of Paris, from our schooldays, as it turns back into fairly solid gypsum when you add water so that you can use it to make plaster casts. Gypsum is produced industrially by excavation in open-cast or shallow mines and also by desulphurisation of coal-fired power station flue gases by reaction with limestone, although that will decrease as we move to renewable energy.

Large single crystal

Acicular (needle-like) selenite

Margaret mentioned the Cave of the Crystals and below is a photograph showing the immense size of its amazing selenite crystals; there are four humans in there to give you some idea of the scale. Naica lies on an ancient fault above an underground magma chamber below the cave. The magma heated the ground water which was saturated with sulphide ions. Cool oxygenated surface water contacted the mineral saturated heated water, but the two did not mix due to the difference in their densities. The oxygen slowly diffused into the heated water and oxidized the sulphides into sulphates. The hydrated sulphate gypsum crystallized at an extremely slow rate of over the course of at least 500,000 years forming the enormous crystals found today. The key to this process is the slow diffusion of oxygen

from the cool, low density surface water into the hot, high density ground water.

The cave of the crystals, Mexico National Geographic

Who's who?

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Calendar

May	31	Fossils course: Field Trip No 2
June	6	Maps Sub-Group: Geomorphic trip to Craig-y-Cilau
	7	Fossils Course: Field Trip classroom discussion
	8	A walk around local quarry sites with John Payne.
	23	A visit to the refurbished Lapworth Museum lead by Rosemary Dartnell
	27	A trip to Hadley Quarry (plus beer tasting)!
August	8	Steering Committee Meeting
	10	Visit to the Big Pit, National Coal Museum
September	5	Registration Morning
	19	Field trip to Bude (until 23rd)
October	12	Talk: Geology of Anglesey
November	9	Talk: Ancient Subduction Zones in the UK
December	14	Talk: Historical Large Scale Volcanism and Future Risks
January	11	Talk: East African Rift Valley
February	8	Talk: Use of Stalagmites in Geology/The Anthropocene
March	8	Talk: What's Underneath a Volcano?

Malvern U3A Geology

http://geology.malvernu3a.org.uk/