

WGCG

Autumn 2010 Newsletter

Issue No 20



*Geology day
Compton Verney*

*Eruptions in
Indonesia*



Mount Merapi, Java

*Warwick Castle
Bromsgrove Sandstone*



*Fossil hunting
Bradley Fen*

Warwickshire Geological Conservation Group

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From the Chair

UP AND RUNNING!

Although it's supposedly been the summer, your committee hasn't been idle - far from it.

Much of our work has been to put in place the vital procedures to ensure that the Group is run in a rigorous way which will stand external scrutiny. If I remind you that the Group turned over close on £25000 last year, you will understand that such procedures are vital. All of us are indebted to Colin Frodsham who has put in seemingly interminable hours to see this through. Likewise Hugh Jones put in a vast effort to complete the inventory of Building Stones for English Heritage. His voluntary effort has provided the Group with a substantial financial cushion.

Inevitably, even geology groups feel the breath of Whitehall; for us this comes as new guidance from DEFRA on how our Local Sites should be selected and designated. Presently, we are negotiating with our ecological friends to form a joint Local Sites Partnership which will involve representatives from the minerals industry and other 'partners'. This body will scrutinise and decide on all proposals for new Local Sites (formerly RIGS).

What 'drives' many in the Group is practical conservation and volunteers have made a big impact on the section which will adjoin the Sustrans cycle route adjacent to Kenilworth Common. Much scrub and talus was removed leaving a section which is now ready for the County Council to tackle with a JCB. I had hoped to tell you that we had gained funding to start the interpretation work but, sadly, our application was rejected by WREN and now the whole cycleway project is threatened by Council cutbacks.

Many of our trail guides are now out of print so a programme has been put in place to revise and republish them. The first should be ready for an event at Compton Verney in association with their *Volcanoes* exhibition in October. Compton Verney will, hopefully, be the first in a series of outreach events. If you know of a group or an event where a WGCG presence might be welcome, especially in attracting new members, please let one of the committee know. We also have members who are willing to speak to groups. If you think your organisation would welcome a geological flavour let us know!

To end on a sad note, two of our most supportive members have died in the past few months – Jane Mitchell and Rob Holloway. We shall greatly miss both of them, especially on our field trips which I know they both greatly enjoyed. Indeed, Rob told me not long before he died that he really hoped to be with us in Pembrokeshire in September. Sadly, it was not to be.

Ian Fenwick

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Opening up a rare exposure Ian Fenwick

In 2009 the Group were offered the opportunity to re-expose the Kenilworth sandstone in a cutting on the old Kenilworth - Berkswell branch which had been closed under the Beeching cuts of the 1960s. The cutting lies between Kenilworth Common and the Coventry Road where the line had to be driven through up to 6m of the sandstone.



Volunteers having a well deserved rest

May WGCG were able to start work.

For the best part of a day a group of 16 volunteers tackled a stretch some 30m x 3m, removing not only shrubs but also considerable amounts of talus which had accumulated since the line was constructed in 1884.

After slave-driving from the 'leader', what had been an area of scrub with a few lumps of rock poking through, looked much more like a real rock outcrop. We now await the arrival of a JCB to remove talus that was too much for manual clearance, after which it is hoped that our volunteers will be willing once again to manicure the section.

On completion, the plan is to provide interpretation panels for the public but our first bid for funding has been rejected so we are currently seeking other avenues to finance this vital element of the project.

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Warwick Castle - one for an Autumn visit Ian Fenwick

When the leaves fall, a good place for any geologist to be is the approach to Warwick Castle from the Avon bridge. Why? Well, it's at this time of the year that the light is good enough to appreciate a little gem. For the better part of 200 metres, the road from the gate cuts through the Bromsgrove Sandstone, or what is often known locally as the Warwick sandstone. For virtually the whole stretch an excellent 4-5m section is exposed thus providing one of the best, and certainly easily accessed, sections in the area.



Bromsgrove sandstone - Warwick Castle drive

The Bromsgrove Sandstone was deposited by very variable streams which migrated from year to year, cutting new channels through previously deposited sediments. At the castle, we see evidence of this today in the form of shallow saucer-shaped erosion surfaces (channel structures) cut into otherwise undisturbed bedding. Moreover, the sands were often laid down in the slack water

ahead of an advancing dune thus giving a steeper dip to the deposit than that of the annual sedimentation layer i.e. cross-bedding. These structures are often well seen in the Bromsgrove and some members had the chance to view the excellent sections at Rock Mill & Coton End when we visited those sites in August. However, not only is the drive on public access but at Warwick Castle there is the opportunity to appreciate the relationship of the structures over a long distance.

For those with an interest in the 'superficial', the drive section also displays a fine weathering profile in which much of the preliminary weathering is being accomplished by large tree roots which ramify through the extensive joint systems in the sandstone.

The north side of the cutting is best illuminated during the middle part of the day; the southern only in the very early morning and then best in April / May before the leaves are fully out.

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Field trip to Bradley Fen claypit Frank Wells

The last but one field trip of the summer was to Bradley Fen claypit at Whittlesey in Cambridgeshire. This was the traditional joint meeting with the Leicestershire Literary and Philosophical Society (the geological Section I hasten to add!) and, together with WGCG, the Stamford Geological Society was also represented. In fact the leader of the trip was Cliff Nicklin, from the Stamford Group.

The pit is situated in the Lower Oxford Clay. The Oxford Clay spans the boundary between the Middle and Upper Jurassic and is present in a great belt, from Weymouth in Dorset, to just north of the Wash. It reaches 180m in thickness in some places and in eastern England it is followed by a substantial thickness of younger Jurassic clays, culminating in the Kimmeridge Clay.



Bradley Fen claypit

The Oxford Clay indicates deposition of a 'mud blanket', in a deepening sea. Parts of the Lower Oxford Clay are rich in organic material, and this was a characteristic of the Bradley Fen quarry as we found on our trip. The later Kimmeridge clays show this feature to an even greater extent and contain oil shales in places, for example in the Kimmeridge area itself.

Bradley Fen is an active clay pit, only nine years old, but already nearing the end of its active life after which it will be flooded and become a wildlife area. Cliff noted that, with the downturn in the economy, the quarry was relatively quiet, but two to three years ago it was producing clay for housebricks on an enormous scale. It is a much favoured clay for this purpose, because it contains a high proportion of organic matter, and, after the initial firing, the brick kilns need no external source of organic material, the organic content of the clay itself providing the fuel. Apart from great numbers of belemnites and ammonites, many fine examples of fish and marine reptiles have been found there. Whilst he was giving the introduction, Cliff noticed a fossilised fish scale!

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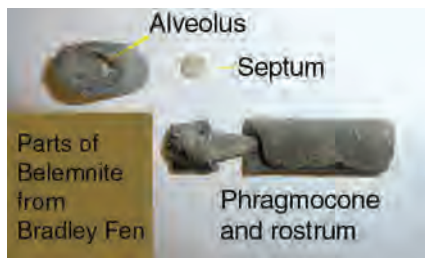
The day was mostly spent fossil hunting, and though the finds were largely confined to the common fossils noted above, it was an interesting area, especially for someone as unversed in the study of fossils as I am. Cliff showed us the detailed stratigraphy of the area, and there were about 50 individually identified strata, which could be seen to some extent on the open face of the clay pit, but did not, to the uninformed eye appear very different. Some were as thin as 20 cm and most less than a metre.



Fossil hunting

The clay was grey and remarkably shale-like in places, with fine lamination, and sheets could easily be separated. Doing this revealed large numbers of ammonites, largely in the form of impressions, with a fine, partial covering of fossilised shell. These were very fragile, especially when wet, and difficult to preserve. There were a number of concretions, usually oval, rounded stones, which held more durable ammonites, but it was not often easy to obtain a specimen without taking away the whole rock, because the concretions were quite hard, and split unpredictably under the hammer.

In particular parts of the pit, belemnites were to be found scattered across the ground. Very few of them were intact, except for the very smallest specimens, but nevertheless they were interesting. This was because quite a few showed a feature which is often not seen in belemnite fossils, which is the phragmocone.

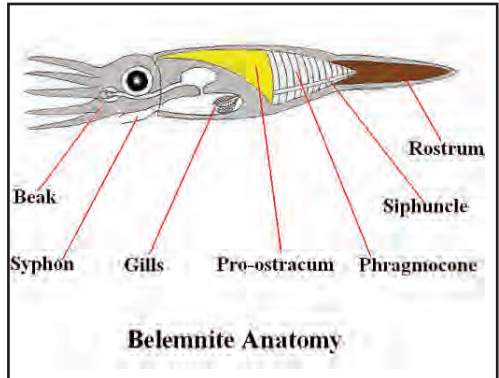


Parts of Belemnite

Cliff explained the structure of the belemnite, of which we generally only see the 'rostrum' which is the solid, bullet shaped fossil which most of us recognise. The rostrum was about a third of the length of the belemnite, and formed the posterior end of the creature and probably acted as a counterbalance to the head and arms when swimming.

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The middle section was the phragmocone, which was used to control buoyancy. It consisted of septa, separating compartments which could be filled with air or water via a siphon; the phragmocone was conical. In most belemnite species the phragmocone fitted into a conical depression in the rostrum (called the alveolus). Both the alveolus, and parts of the phragmocone were to be seen in several of the fossils at Bradley Fen.



Belemnite anatomy

Interestingly, though both made of calcium carbonate, the rostrum is calcite and the phragmocone, I believe, is aragonite. The third main section of the belemnite, at its forward end, was the 'pro-ostracum', which supported the fleshy gills, head and arms. The whole three part structure was enclosed by a fleshy mantle making it look much like a squid. The pro-ostracum and the fleshy tentacles are very rarely found in fossilised form. The accompanying photos show the basic structure and some of the elements found at Bradley Fen.

Another interesting aspect of the belemnites, is that the brickmakers did not like them as they caused the bricks to explode during firing!



Ammonites in shale like clay

I am not aware of any very unusual fish or marine reptile fossils being found during the day, but I think we all enjoyed ferreting around in the clay with its numerous ammonite and belemnite remains. It was easy to imagine the area as an ancient bed of mud lying beneath a fairly deep sea full of belemnites, ammonites and other creatures, the remains of which lay about us in such numbers.

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Compton Verney geology day - 16th October

Display - 11am until 3pm

WGCG will be putting on a display and hoping to attract new members. If you are interested in helping man our 'stall' which will be in the entrance hall of the gallery. please let Brian Ellis know at either brian@cwellis.freemove.co.uk or 024 7646 8571.

Lecture and exhibition tour- 3pm

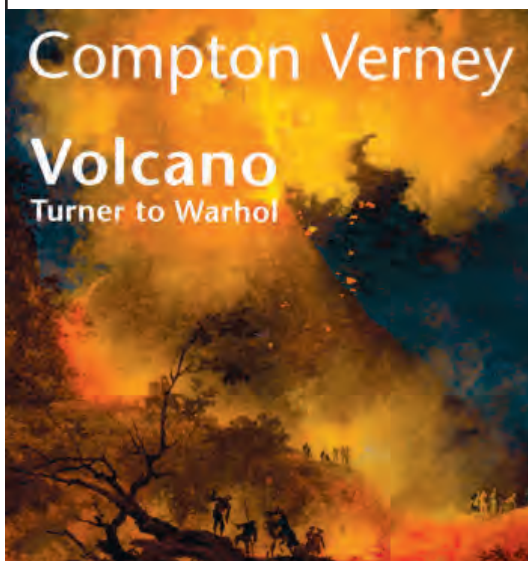
"Mountains of Fire: The science and art of volcanoes".
Dr Carl Stevenson of the Earth Science Department at Birmingham University

Compton Verney exhibition - Volcano - Turner to Warhol

This is the first exhibition to celebrate the extraordinary artistic outpourings that volcanic eruptions have triggered over the past five centuries.

The exhibition ranges from early engravings, showing imagined cross-sections of the fiery centre of the earth, to an explosive series of paintings by Joseph Wright, J M W Turner and Andy Warhol. It is a chance to examine the presence of volcanoes as geological phenomena and their power and influence, through an exciting range of historic and recent works of art.

Eye-opening and spectacular, the exhibition traces a route through the sequence of volcanic eruptions - from the calm volcano and first ominous rumblings, to cataclysmic explosion, through panic and death to aftermath, and then quietly back to dormancy and extinction.



Exhibition opening times

24 July - 31 October 2010

Tuesday - Sunday 11am - 5pm

Compton Verney
Warwickshire
CV35 9HZ

Telephone:
01926 645500

Website:
www.comptonverney.org.uk

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Tectonics of the Indonesian Archipelago

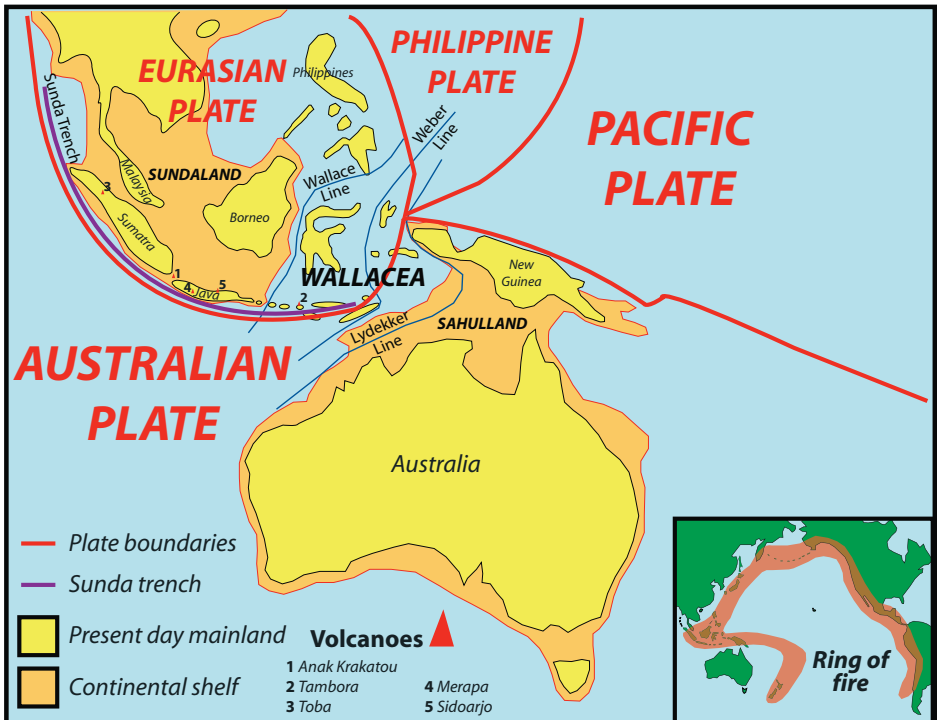
Jim Passmore

Continental drift

In 1912 Alfred Wegener proposed his theory of continental drift - that continents were slowly drifting around the Earth. In 1929, a scientist named Arthur Holmes tried to resurrect this theory. At the time Wegener was widely ridiculed and Holmes ignored. It was only in the 1950s that it became an accepted theory with plate tectonics revolutionising geology during the 1960s.

The Ring of Fire, stretching up the west coast of the Americas across and down the east coast of Asia, round the Indonesian archipelago and across to New Zealand, lies at the subduction zones of some of the plates.

In the Indonesian archipelago, to the west of the New Guinea coast, is a confluence of four tectonic plates - Eurasian, Australian, Philippine & Pacific. However most of the seismic activity in the region occurs at the subduction zone junction of Eurasian & Australian tectonic plates with the Australian plate sliding under the Eurasian plate.



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Along this junction, just off the coast of Sumatra and Java, lies the Sunda Trench stretching from the Andaman islands to the south of Myanmar (formerly known as Burma) to the west of New Guinea. This is 2,600 kilometres long with a maximum depth of 7,725 metres.

This subduction zone has been the cause of many catastrophic events, one of the most recent being on December 26th 2004. An earthquake, magnitude 9.3 on the Richter scale, occurred off the north coast of Sumatra. Now known as the **Sumatra-Andaman** earthquake, it created a tsunami causing great destruction and loss of life around the Indian Ocean

Volcanic activity

Indonesia has over 130 active volcanoes, the majority on the islands of Sumatra and Java, more than any other country, the most active being Merapi near Yogyakarta in central Java.

The explosiveness of an eruption varies enormously. Relative explosiveness of volcanic eruptions is measured using the Volcanic Explosivity Index (VEI). This index, with a scale of 0 to 8, was devised by Chris Newhall of the U.S. Geological Survey and Stephen Self of the University of Hawaii in 1982.

VEI	Ejecta volume	Classification	Description	Plume
0	<10,000 m ³	Hawaiian	Non-explosive	<0.1 km
1	>10,000 m ³	Hawaiian / Strombolian	Gentle	0.1 - 1 km
2	>0.001 km ³	Strombolian / Vulcanian	Explosive	1 - 5 km
3	>0.01 km ³	Vulcanian / Peléan	Severe	3 - 15 km
4	>0.1 km ³	Peléan / Plinian	Cataclysmic	10 - 25 km
5	>1 km ³	Plinian	Paroxysmal	>25 km
6	>10 km ³	Plinian / Ultra-Plinian	Colossal	>25 km
7	>100 km ³	Plinian / Ultra-Plinian	Super-colossal	>25 km
8	>1000 km ³	Ultra-Plinian	Mega-colossal	>25 km

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Several notable eruptions have occurred in the Indonesian archipelago:

Merapi - 2006 - VEI level 1

Agung - 1963 - VEI level 5

Perboewatan- 1883 - VEI level 6

Tambora- 1815 - VEI level 7

Toba- 70,000 years ago - VEI level 8

The most active volcano in Indonesia, Mount **Merapi** (Mountain of fire) 3000m high, has been rumbling for over 10,000 years producing pyroclastic flows but having little gas. In consequence the eruptions have little explosive force. The most recent eruption was on May 27 2006 with a Volcanic Explosivity Index (VEI) of 1.



Volcanic rumblings at Mount Merapi

At the same time as the eruption there was an earthquake, magnitude 6.3, near Yogyakarta with an epicentre 25km to the south-west on the Java coast.



Earthquake damage at Prambanan

During a visit to Indonesia in November 2006 I journeyed to Yogyakarta. Whilst there I took a trip to mount Merapi hoping to climb to the summit, this being a local tourist attraction. However it was off limits, still having some activity following the eruption earlier in the year. I had to be satisfied with a view from the base. I also paid a visit to the temples of Borobudur and Prambanan.

Whilst Borobudur, a 9th century Mahayana Buddhist temple, was left unscathed after the earthquake the nearby 9th century Hindu temple of Prambanan (a recently restored UNESCO World Heritage site), suffered extensive damage.

Official tourist visits had been stopped and one needed to give one of the guards a little something to be allowed in. Great cracks could be seen in the main temple with bamboo sticks being used to prop up some stone lintels.

The island of Bali, to the east of Java, is often thought of as a romantic destination, but it too has its share of active volcanoes. On 17th March 1963 mount **Agung** erupted generating massive pyroclastic flows devastating numerous villages, killing approximately 1500 people. Cold lahars caused by heavy rainfall after the eruption killed an additional 200. A second eruption on May 16 led to further pyroclastic flows which killed another 200 inhabitants. The VEI of this eruption was level 5.

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In the 19th century the island of Krakatoa was destroyed. Contrary to the title of the popular film "*Krakatoa East of Java*" it was actually an island, height 450m, between Java and Sumatra to the West of Java. The island, one of a group of three, had three volcanoes - **Perboewatan**, **Danan** and **Rakarta**. In May 1883 the volcano **Perboewatan** became active and, after three months of mild rumblings, suddenly erupted on 26th August 1883 and on the following morning it exploded with a catastrophic blast having a VEI index level of 6. Over half of the island subsided into a caldera 6km in diameter 250m below sea level.

Great destruction and loss of life was caused by both the explosion and the resulting tsunami. The dust particles and sulphur dioxide ejected reached the stratosphere and remained for several years causing a drop in the average temperature for several years.

The volcano remained active under the sea, growing gradually until, in 1927, steam and debris could be seen coming out of the sea. In 1928 the volcano broke the surface. Today the volcanic island known as Anak Krakatau (Child of Krakatoa) is over 300m high, and erupting most years.

Javanese scriptures recall a similar event on Krakatoa occurring just under 1500 years earlier in 416AD.

Mount **Tambora**, a 4300m high volcano on the island of Sumbawa , had lain dormant for some 5500 years when on April 15th 1815 it erupted with a force four times that of Krakatoa, VEI index 7. In 1816 crop failure and mass famine occurred, the dust particles and sulphur dioxide ejected having reached the stratosphere. The resulting caldera was 6km in diameter and the height reduced from 4300m to 2850m.

Going back further in time, around 70,000 years, an even greater volcanic event occurred in north Sumatra where lake **Toba** lies today. Leaving a caldera of 100 x 30km it is believed that its VEI index level was 8.

Other disasters are man-made. Whilst the recent, now capped, oil well in the Gulf of Mexico received wide publicity another similar drilling disaster occurred in May 2006 at **Sidoarjo** in Java - a mud volcano. Although there has been no loss of life thousands have been made homeless with the destruction of five villages.

Today this eruption continues to spew out 50,000 cubic metres of mud each day.



Extent of the Sidoarjo mud volcano

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Black Country Geological Society (BCGS)

Meetings are held at Dudley Museum & Art Gallery, St James's Road, Dudley, West Midlands. England. Phone (01384) 815 575.

Monday 25th October

Is Man's role in Climate Change significant? Speaker: Colin Knipe
A geological review of past climates and processes that created them with an eye to understanding what is happening to the climate in our time.
Open at 7.30pm, lecture commences at 8.00pm.

Monday 29th November

Members' Evening and Christmas Social. Refreshments will as usual be provided in the convivial atmosphere of the festive season.
Meeting starting at 7.00pm

Leicester Literary and Philosophical Society Section 'C' - Geology (CHARNIA)

All held at 7.30pm in Lecture Theatre 3, Ken Edwards Building, on the main University of Leicester campus, **except where stated**. Refreshments served from 7.00pm.

Wednesday 20th October Skullduggery: how big was Leedsichthys?
Dr Jeff Liston (Museum & Art Gallery, University of Glasgow).

Monday 1st November Monitoring active volcanoes.
Speaker Dr Hazel Rymer (Dept. of Earth and Environmental Sciences, Open University). **Venue - New Walk Museum, Leicester.**

Wednesday 3rd November

Exceptionally well preserved fossils from Charnwood & Christian Malford
Dr Philip Wilby (British Geological Survey, Keyworth)

Wednesday 17th November

Fast and furious: witnessing the birth of Africa's new ocean
Dr Tim Wright (School of Earth and Environment, University of Leeds). .

Wednesday 1st December

Stromatolites: microbes making rocks.
Dr Kenneth McNamara (Dept of Earth Sciences, University of Cambridge).

Wednesday 15th December

Christmas Meeting, **Venue - New Walk Museum, Leicester.**

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Winter evening meetings 2010 - 2011

Wednesday 15th September 2010

Tenerife Volcanoes
A talk by Brian Ellis

Wednesday 20th October 2010 - AGM

Conservation: where we've been and where we're going
A talk by Ian Fenwick

Thursday 4th November

Lead Mining in the Peak District
A talk by Paul Chandler (Peak District Mining Historical Society)
(NOTE: THURSDAY 4th)

Wednesday 15th December 2010

Christmas soiree with members displays and rock samples

Wednesday 19th January 2011

More interesting fossils. Hugh resumes his talk from February 2010.
A talk by Hugh Jones

Wednesday 16th February 2011

TBA

Wednesday 16th March 2011

Antarctica Rocks
A talk by Tom Sharpe (National Museum of Wales)

Wednesday 20th April 2011

TBA

Dates shown for 2011 are provisional. Following the closure of the **Senior Citizens Club** at the end of 2010 our talks will be moving to a new venue in January 2011. Details will be provided nearer the time

Arrangements for the unexpected cancellation of meetings:

An email will be sent to all members, and phone calls to those not on line.

The WGCG mobile phone will be answered on the day from 11am:

The number to ring is 0752 7204184