

Dorset GA Group



Newsletter Spring 2019

Contents

Page 1: Editor's notes and Saltwells field-trip report. Page 2: Saltwells/Xmas workshop Pages 3-7: Orogenic Events. Pages 7–8: Kingston Lacy House Part 2. Pages 8-10: The Hot Rock Slot Pages 10-11 : Exodus and volcanic activity. Pages 12-14: Kimmeridge report. Page 14: Book review and news. Page 15: For your diary. Pages 16-20: 2019 A.G.M

Welcome to the Spring Newsletter!

Since the last Newsletter we've enjoyed the Xmas Workshop, the AGM and a fieldtrip to Kimmeridge Bay. We've also hosted two successful lecture meetings in Dorchester. As for the programme of future activities, there is plenty to whet your geological appetites! Incidentally, don't forget to renew your DGAG membership (due 1st January 2019) to continue receiving this Newsletter. I'd like any contributions for the Summer Newsletter by **Monday 20th May please**. Thanks, *Kelvín*



Saltwells: DGAG visit a site in the Black Country Geopark. 21/05/2018

On our final afternoon, after seeing the Wren's Nest, we went to Saltwells where we saw rocks from two periods. The first and oldest rocks are Silurian (between 420-417 million years) contain evidence of the change from an ancient seabed to dry land. The second series of layers are Carboniferous and show that this land was covered by huge swampy forests with trees growing up.



We passed down the cutting, the remains of an **inclined tramway** used to carry minerals from Doulton's Clay pit to Dudley No. 2 Canal. These muddy, shelly rocks are about 420 million years old. The **Brewin's Canal Section** is an important rock face. It is a SSSI because in the rock face it is possible to see the **contact** between the old landscape of Silurian rocks and the base of the Black Country coal field. The lowest layers of rock you see are the greenish-grey shales of the Silurian above which rest distinctly pebbly and gritty yellow layers. The contact is shown here.





The shiny **black coal streaks** are the remains of flattened trees lying within the pebbles of an old river channel. There is very little difference in the direction and angle at which the pebbly beds and the underlying shaley beds can be seen despite there being a time gap of about 100 million years between them This is rare in geology and makes this a very special site.



These yellowish sandstones have circular holes in them created when hot magma was injected into the crack 307 million years ago. The magma boiled the water sitting within the rocks and bubbles of steam created these **circular hollows**.



After the Carboniferous, at 307 million years ago the landscape was faulted and folded by earth movements and hot molten magma forced its way into the cracks, cooling to form vertical intrusions that cut across the other rocks. This **dark black/green micro-gabbro** is an igneous rock similar to basalt that was injected as molten rock into the rock layers 307 million years ago.





Graham Worton pointing out the hollows with close-up shown above.

The rocks here are Carboniferous, around 310 million years old. From an industrial perspective, the Saltwells area had rich seams of coal, fireclay and ironstone. The abundant fireclays were used to make clay products. Doulton's pit was worked for coal and fireclay by the Royal Doulton Company.

The treeless area at the top of the rock face is where the layers of **South Staffordshire Thick Coa**l were once extracted. These rock layers formed when the area was covered by huge flooded tropical forests. The dark layer in high rock face is a coal seam called the **Heathen Coal**. The grey muddy rocks are ancient soils from these forests which produced the clays and ironstones so valuable to the Industrial Revolution.

Report and pictures by Pauline Dagnall. (There are plans to make another visit to the Black Country in 2020. Kelvin)

DGAG Xmas workshop on December 8th, 2018

Everyone seemed to enjoy this year's workshop which over 30 members attended. There were about a dozen display tables which included members' fossil collections and a presentation on the Variscan orogeny by Alan. We also had a display of Geoff Townson's wonderful paintings, displays by DIGS and DGAG (on our new boards), beef from the Jurassic of Dorset plus work produced by the DBS (thanks Pete!) and our new website. The sales stall did a brisk trade, thanks to donations from Tom Sharpe at the National Museum of Wales and Michael King, a long-time DGAG member. As I'm muddling my way through as stand-in Events organiser, I was relieved that the lunch buffet tables were groaning with food, most of which disappeareddiscussing Geology is obviously hungry work!

Alison did really with membership renewals proving DGAG is alive and well. A big thanks to everyone who brought display material, those who contributed to our Xmas feast and of course the members who turned up to support DGAG. Kelvin Huff

OROGENIC EVENTS (mountain building episodes)

<u>General framework</u> A standard sequence of events may be identified associated with any orogenic event. Some or all of these may be present. These are related to plate tectonic processes at subduction zones where plates come together (destructive margins). These events may not all be developed to the same degree in one area e.g. the Caledonian Orogeny in the U.K. shows evidence of a much higher grade of metamorphism than the Variscan Orogeny. However, the Variscan Orogeny in other parts of Europe does show higher grade metamorphism. Similarly, the effects of the Alpine Orogeny are very modest in the U.K. while they are much more extreme through the Alpine zone of central Europe.

(1) A period of sedimentation often with turbidite sequences forming greywacke sandstone normally with inter-bedded mudstone or shale. These deposits are sometimes termed flysch.

(2) A period of volcanic activity associated with island arc formation (often andesitic). Also pillow lavas may occur if there is submarine volcanicity.

(3) Continental collision occurs with earthquake activity resulting in folding and faulting with regional metamorphism forming slates at shallower depths, schists and gneisses at greater depth. Fragments of ocean crust may be incorporated into the continental crust forming ophiolites.

(4) Associated with continental collision there will be crustal thickening linked to mountain building. Crustal thickening induces heating in the crust and crustal melting bringing about the formation of granitic magmas which are intruded high into the crust. This in turn causes contact metamorphism.

(5) The igneous activity often gives rise to formation of metalliferous minerals.

6) The uplifted mountains are eroded producing coarse clastic sedimentary accumulations termed molasse. This stage is post-tectonic although earthquakes are still likely to occur along fault lines and isostatic uplift will occur as erosion takes place helping to expose what were deep levels in the crust.

Caledonian Orogeny.

The Caledonian mountain range was formed as a result of the Caledonian Orogeny at the end of the Lower Palaeozoic. With the closure of the lapetus Ocean, it affected rocks formed, during the late Precambrian and Lower Palaeozoic in what is now Spitzbergen, Scandinavia, British Isles and eastern N. America (Newfoundland and the Appalachians), there being no Atlantic Ocean at the time, a distance of some 7,500 km. In the U.K. the N.W. boundary is marked by the Moine Thrust and the S.E. boundary by the Midland Craton (central England). There is good evidence for the orogeny within the stratigraphic record which is much more complete than for earlier orogenic events. The fossil evidence is much better (for dating and correlation). Faunal provinces have been identified on either side of the lapetus Ocean, which opened during late Precambrian times (700 Ma ago) and closed at the end of the Lower Palaeozoic or early Devonian (400-420 Ma ago). Evidence for the orogeny is derived from sedimentation, volcanism, deformation, metamorphism, plutonism, and more recently from paleo-magnetic studies. The British Isles straddles the Caledonian orogenic belt, a long narrow, linear feature with late Precambrian and Lower Palaeozoic sediments associated with igneous rocks (volcanic and intrusive) affected by deformation and metamorphism with uplift at the end of the Silurian, forming a mountain chain. Various zones of activity can be identified in the British Isles (a) Moine Thrust, (b) Grampian Highlands, (c) Southern Uplands, (d) Lake District, (e) Wales.

The sediments vary considerably in thickness across the orogenic belt from 20,000 m. in the Grampians (now much deformed and altered) but 1000 m. or less in the stable foreland areas of N.W. Scotland and the English Midlands. Sediments were thickest in the centre of the sedimentary basins (often ocean margins) where it was much affected by orogenic activity. In the stable foreland areas (cratons) there was only epeirogenic movement and the sediments might be tilted or otherwise undeformed. Earlier ideas for the development of such mountain belts was based on the concept of geosynclines (extensive basins in sediments accumulated). However, this has been replaced by plate tectonic processes and concepts since the 1960s.

Three periods of deformation have been identified:

(a) at the end of the Precambrian - Celtic event

(b) Lower Ordovician - Grampian event

and (c) from Lower Ordovician through to Lower Devonian particularly affecting the southern part of the orogenic belt (Acadian event).

The Celtic event affected small outcrops in Anglesey, Eire and the Channel Isles Sedimentation continued at this time in Scotland through late Precambrian and Cambrian without a break. The Grampian event had its main effects in the Ordovician with regional metamorphism producing schists of the Barrovian and Buchan Zones (Grampian Highlands). The southern side of the orogenic belt was affected by movements through from Ordovician to Lower

Devonian with low grade regional metamorphism producing slates and limited granitization (Lake District, N. & Mid Wales). All these effects produce a remarkably asymmetric orogenic belt which suggests a different evolutionary history for the different parts of the Caledonides Belt.

N.W. part - Grampians.	S.E. Part. Lake District, N and mid Wales.
Medium to High grade regional meta- morphism - schists	Low grade metamorphism - slates
Little volcanism	Widespread Ordovician volcanism
Many granitic plutons, some gabbro	Little evidence of plutons

It was suggested in 1966 that the evolution of the Caledonides was related to the opening and closing of an ocean with associated sedimentation, igneous activity and tectonic processes. Ocean floor spreading occurred with three subduction zones. there have been several suggested models to relate to the observed features. There is general acceptance that plate tectonic processes fit but there is disagreement over the details.

There are three main lines of evidence (a) the presence of ophiolites and fragments of ocean floor. (b) subduction zone features with trench sediments and island arc volcanism. (c) evidence of former separation of continental plate material - faunal provinces and paleo-magnetism. Similar evidence can be used for other orogenic events. e.g. Variscan.

<u>Ophiolites</u> These include ultrabasic rocks (serpentinised), basic dykes and pillow lavas which formed slices of ocean crust and mantle caught up in the continental crust during continental collision. These may occur at the suture between the two colliding plates. There may also be obduction where ocean crust is pushed up onto the top of continental crust.

A number of ophiolite areas have been identified, the Highland Border Series along the Highland Boundary Fault, the Ballantrae area of the Southern Uplands and the Mona Complex of Anglesey (fig 4b). The evidence for all three being ophiolites is not conclusive but the Ballantrae one shows best evidence, probably of obduction from a small marginal sea (rear arc situation). There is better evidence in Newfoundland which is part of the same orogenic province.

<u>Faunal provinces</u> Faunas with different characteristics occupy different areas controlled by environmental conditions and the distribution of land and sea. Land is a barrier to migration of marine faunas as might be a deep ocean for a continental shelf fauna. Two provinces have been identified - an Atlantic Province which includes England and Wales, Eire, S. Newfoundland and the extreme E of the U.S.A. (New York), and a Pacific Province which includes Scotland, N. parts of Ireland, N. Newfoundland and then running down through the western Appalachians. The Cambrian trilobite faunas are different in the two provinces, so are the Ordovician trilobites and brachiopods (shelf fauna). Even the Early Ordovician graptolite faunas are different, which being pelagic should have floated across deep water without restriction. The boundary between the faunas coincides with the suture line along the Solway Firth. Intermingling of the faunas in the Silurian suggests that the barrier was no longer effective. Graptolites crossed first to mix the two faunal provinces, then organisms with planktonic larval stages, then benthonic faunas and finally freshwater fish.

Sedimentary Facies Deep ocean sediments with oozes (clay, siliceous and calcareous) have counterparts in continental shelf facies with minimal sediment supply - e.g. long way from land or land with low relief. However, if these sediments are found with ophiolite material it is often a good indicator of oceanic conditions. This is seen in the Ballantrae Complex with siliceous oozes (radiolarian chert). Also, there are thrust slices of greywacke sediments (from turbidites). This is typical of subduction zones and of what is called an accretionary prism. Such greywacke deposits are termed flysch. Each fault slice has a submarine fan facies (greywackes) over an abyssal plain facies (muds) with the age increasing up the sequence because of under-thrusting. This is well demonstrated in the Southern Uplands in Ordovician and Silurian sediments. There must have been a N.W. dipping subducting plate. The Dalradian sediments (subsequently metamorphosed) and those in Wales are likely to represent thick accumulations in deep shelf basins. Volcanism The volcanic activity is predominantly Ordovician in age and is particularly well developed on the southern flank of the orogenic belt. A subducting plate was melted down and the resulting magma being of lesser density than the mantle and the solid crust rose to the surface to produce island arc volcanism. Change in chemical composition of igneous rocks across modern subduction zones occur because of variation in the magma composition derived from various depths i.e. from the descending subducted plate. Tholeiitic basalts in the oceanic areas trend into calc-alkaline then alkaline lavas with increasing K₂0 content. This has been identified in the N to S changes through the Lake District and Wales suggesting a south dipping oceanic plate and similar evidence has been found in Newfoundland. There are not sufficiently large suitable outcrops of rocks elsewhere to identify such a change.

<u>Plutonism</u> occurs resulting from the cooling of the magma chambers which feed the volcanoes and are exposed after long periods of erosion. Also, continental collision occurred followed by crustal thickening and heating, melting of the continental crust causing granitic magma formation.

This moved high into the crust as batholiths and is well developed on the Scottish margin of the Caledonian Belt.

<u>Structure</u> The Moine Thrust forms the N.W. boundary of the Caledonian orogenic belt. Displacement may be up to 100 km. with a series of movements at the end of the Lower Palaeozoic. There is a low angle thrust fault with imbricate structures because of the extreme crustal shortening resulting from continental collision. The main movement was probably in early Devonian times with the final closure of the lapetus Ocean and the collision of two continental areas along the suture line which coincides with the Solway Firth.

The Grampian Highlands forms the central metamorphic zone of the Caledonides with complex structures between the Great Glen Fault and the Highland Boundary Fault. Moinian rocks pass conformably up into the sediments of the Dalradian Supergroup sequence (late Precambrian and Cambrian age). These were then intensely deformed to produce nappes on the margins with upright folds in the centre of the structure. There is evidence of 8 different events causing folding and refolding of structures. This again suggests compressive shortening resulting from the closure of the lapetus Ocean. The structures also have a typical N.E. to S.W. Caledonian trend. The main period of deformation in this case appears to be during the Ordovician (Grampian orogenic event) due to island arc collision with the main continental block. There were later lesser effects at the end of the Silurian and during early Devonian times. The Southern Uplands has thrust faulting and folds due to subduction processes affecting sediments from Early Ordovician to Late Silurian age. Oceanic basalts and cherts are overlain by greywackes and shales and 10 separate fault slices have been identified. Individual blocks young towards the N.W. but the whole sequence youngs towards the S.E This was produced by under-thrusting in the trench associated with subduction. Folding in the thrust slices is asymmetric with a gentler N.W. limb and steep S.E. limb, the S.E. limbs are often thrusted out.



Diagram to represent the features of an accretionary prism similar to that which forms the Southern Uplands of Scotland

<u>Suspect terranes</u> is another concept which is important in structural geology. They are pieces of crust with clearly defined boundaries which differ significantly in tectonic evolution from neighbouring regions. They exhibit internal homogeneity and continuity in stratigraphy as well as tectonic style. However, they differ markedly from adjoining regions by discontinuities in structure and stratigraphy which cannot be explained by normal facies or tectonic change. One area where this has been studied is the North American Western Cordillera (Rocky Mountains) occurring where island arcs are emplaced during collision.

The relationship between the Southern Uplands and the Lake District demonstrates the principle of suspect terranes within the Caledonian Orogeny. Strike slip faulting such as along the Great Glen Fault is thought to explain the difference if geological history of adjacent areas.

Alan Holiday

Kingston Lacy House Part 2 : Building Stone

Rock Thin-sections: Strong sparitic cementation and potential porosity are best revealed in the **Portland Whit Bed slide.** Cementation in XPL is by pastel-shaded inter-granular colouring of sparite and potential porosity by blue/green staining added for this purpose is also very visible in PPL. In the other two thin sections intergranular porosity is coloured in black. On rotation of the XPL microscope stage sparite cement has undulose-like extinction along the cleavage. In PPL this sparite cementation is revealed only by low relief of the sparite and any potential porosity by the 'transparency' of intergranular spaces. **Wardour Upper** - the oolitic limestone, in XPL has the sparitic cementation tinged brown with micrite and in the **Wardour Lower** - glauconitic sandy limestone, the cement can be far browner than at all sparitic looking. Even in these very condensed images seen here, the lack of sparite in relation to micrite in the cement is easily seen and it is fair to say that the so sparitic well-cemented Portland, will be the harder and least easily weathered over long periods of time. A thin section at high magnification may reveal inter-cavity porosity on that plane but not of course necessarily in 3D.

As can also be seen comparing both our scaled photos with each other and or with thin sections, the grain size of the same named stone from different quarries, or even the same quarry, can vary greatly. So porosity and resistance to weathering and organic coating as building stone is not guaranteed by stone name alone. *(For more on textures please see References below.)*

Scaled Close-ups; 20 x 20mm showing commonly visible variations in bioclastic texture and grain size of these three stones. (*For better texture, cementation and porosity of matrix – please see rock thin-sections below.*)



PB DSC 1396 - WL/MBS - Wardour Lower/Main Building Stone. Prov. Dean Harris. GT colour adjusted.

PB DSC 1406 - WU/OBS - Wardour Upper/Oolitic Building Stone. Prov. John Needham. GT colour adjusted.

PB DSC 1405 - Base of Whit Bed. Prov. Dean Harris. GT colour adjusted.

Rock Thin-sections: cementation and potential porosity are revealed - in PPL by intergranular black spacings and cementation by the pastel colouring of intergranular sparite. *(For more on textures please see References below.)*



PPL/XPL Wardour Lower/Main Building Stone aka (MBS) Mike Le Bas, University of Leicester. No.120261 Canon 0321/0322 x 2.5 obj @ 3 -121 Scale 0.1mm. *PJB.*



PPL/XPL Wardour Upper/ Oolitic Building Stone, W.G.Townson No. UQC2 (revised.) Canon 0772/0771 x 2.5 obj @ 3 -121 Scale 0.1mm. *PJB*

PPL/XPL Portland Freestone, Whit Bed 1.2m below top. M.R.House PL Ltd. No15 Canon 0238/0240 x 2.5 obj @ 12-119 Scale 0.1mm (not shown but as above).

See also M.R. House 'Geology of the Dorset Coast Plate 12 for lower mag. PPL

view. N.B. (Scale line omitted because it spoils the image quality.) PJB

References:

A Colour Atlas of sedimentary Rocks – Adams et al.

A Colour Atlas of Carbonate Sediments and Rocks Under the Microscope – Adams et al. http://dorsetbuildingstone.weebly.com/portland-limestone-ndash-wilts-chilmark.html http://dorsetbuildingstone.weebly.com/portland-stone---dorset.html

Pete Bath

The Hot Rock Slot

Mylonites

Mylonites are metamorphic rocks that have undergone intense plastic deformation and are characteristic of crustal shear zones and the deeper parts of fault zones. As such, they tend to be restricted to planar bodies that may be as thin as a centimetre or as thick as a kilometre. Mylonites are much finer grained than the rocks from which they are derived (Fig. 1), and invariably possess a very strong tectonic fabric comprising both an intense foliation (planar fabric) and lineation (linear fabric). In high-strain mylonitic fault zones, the foliation develops sub-parallel to the fault plane itself and the lineation to the direction of stretching (i.e. to the direction of displacement). The term 'mylonite' is from the Greek mylon, to mill, which implies a brittle process of grain fracture; however, this is misleading as it is now generally agreed that the grain-size reduction accompanying mylonite formation is achieved by a ductile process involving dynamic crystallization. By replacing themselves continuously by smaller strain-free grains. Almost any igneous or metamorphic rock can be converted to a mylonite if the stress and temperature conditions are right. In outcrop, mylonites tend to appear as fine-grained, flaggy rocks and usually contain **porphyroclasts** which are relatively large grains of pre-deformational minerals that have resisted deformation (Fig. 2). Relatively low-strain mylonites containing >50% porphyroclasts are termed protomylonites, whereas high-strain varieties containing <10% porphyroclasts are termed ultramylonites. Matrix grains in the latter are typically so small (<0.01mm) that the rocks look flinty in hand-specimen.



Fig.1. Mylonite layer (dark) in granite-gneiss, Encruzilhada do Sul, S. Brazil



Fig.2.Exposure of mylonitised syenodiorite showing an intense foliation wrapping around large alkali feldspar porphyroclasts. Flatraket, W. Norway.

Progressive deformation of relatively weak minerals such as quartz results in shearing and flattening of the grains to form long 'ribbons' (Figs. 3 and 4) and dynamic recrystallization of the highly strained grain margins to form tiny granules (Fig.3); with increasing deformation the proportion of granules increases. Relatively strong minerals such as garnet and feldspars form porphyroclasts round which the fine-grained matrix foliation appears wrap (Figs. 2, 4 and 5). The porphyroclasts themselves are commonly bent (Figs. 5 and 6) and may possess 'tails' of fine-grained dynamically recrystallised material extending from them (Fig. 6). In thin sections cut perpendicular to the foliation but along the lineation, porphyroclasts are commonly seen to be asymmetric, appearing to 'lean' in the direction of shear (Fig. 6). Flow within the fine-grained matrix may result in the formation of folds.



Fig.3. Photomicrograph of a mylonitised quartzite from Flowerdale, N.W. Scotland. Note elongated quartz ribbons, some showing distinct intracrystalline slip planes (centre-left), and marginal recrystallization to tiny granules. Crossed polars. Long axis of field of view = 2mm.



Fig.4. Photomicrograph of a mylonitised garnet schist from Ness, Lewis, N.W. Scotland. Note the porphyroclasts of garnet (pink) and plagioclase (colourless, lensshaped) round which the foliation appears to flow. The matrix consists mainly of quartz ribbons and recrystallized biotite. Plane-polarised light. Long axis of field of view = 5mm.

In the British Isles, mylonites can be found at several places in NW Scotland including (i) along the Moine Thrust (e.g. at the famous Knockan Crag locality, and at Stack of Glencoul), (ii) in the Loch Maree Series of the Lewisian around Gareloch, and (iii) in the Lewisian of north Lewis. Further afield, spectacular granite-mylonites are visible in exposures of the South Armorican Shear Zone in Brittany.



Fig. 5 Photomicrograph of a peridotite protomylonite from Premosello, Val d'Ossola, N. Italy, showing lenticular porphyroclasts of orthopyroxene (grey Interference colours) and olivine in a fine-grained olivine-rich matrix. Note that some of the porphyroclasts are bent. Also note olivine ribbons (lower centre). Crossed polars. Long axis of field of view = 5mm.



Fig.6 Photomicrograph of a granite mylonite from the South Armorican Shear Zone, Inzinzac, Brittany, showing asymmetric porphyroclasts of muscovite (pink interference colours) and feldspar (grey) in a finegrained quartz- and mica-rich matrix. The way the porphyroclasts 'lean' indicates that shearing was topto-the-right. Note also the recrystallized 'tail' extending to the top right from the central feldspar porphyroclast. Crossed polars. Long axis of field of view = 2mm.

Exodus and volcanic activity

I came across this on one of the minor channels on a programme "Secrets of the Bible". I have always been intrigued by the tales in the Old Testament and trying to tie them to possible geographical locations. There are some very questionable and far-fetched ideas being suggested by some "experts" but the geological association of this caught my attention.

The theory is that the fleeing tribes of Israel did not cross the 'opened' Red Sea and got 'lost' in Sinai. Moses collected the tablets of the Commandments on Mt. Sinai. Evidence was suggested for a route through various locations (mentioned in Exodus) across the northern edge of the Sinai peninsula and crossing the Gulf of Aqaba at its northern end across the Sea of Reeds, (suggesting a mistranslation).

Now the interesting part (for geologists!). Exodus states that during the day the tribes were guided by a column of smoke and at night by a column of fire. From a route as suggested this sounds like it could be an ongoing volcanic eruption seen to the east. The volcanoes in Arabia were then examined. There is the possibility that one of the northern ones of these was in eruption at the time. The programme went on to suggest that other phenomena such as the burning bush may also be linked to volcanic events.

I dived into the Internet and found information on this area of vulcanicity as both I and others I spoke to knew nothing about it. Attached is a small extract and a map. There is much more and some stunning photos of recent cones. Interestingly, Exodus suggests that the Israelites crossed the Jordan river before coming to Jericho. I think they would have only done this if they came from the east into the 'Promised Land' having moved north from Arabia. The eruption of Santorini has been linked to the Plagues of Egypt but I have read that date-wise they do not line up. I hope I haven't offended anyone by these suggestions but like the idea of the possible connections.

Extract from Volcano Discovery web page:

"The young volcanic fields of western Arabia (Harrats) are less than 10 million years old and not directly related to the Red Sea Rift. These young volcanoes and lava-fields form a distinct 600 km long N-S chain (Makkah-Madinah-Nafud volcanic line) and the vents are aligned N-S, different from the NNW-SSE direction of the Red Sea Rift. It forms the axis of uplift of western Saudi Arabia.

Between Makkah and Madinah is the 20,000km2 Harrat Rahat lava field with 644 scoria cones, 36 shield volcanoes and 24 domes. Between Madinah and the Great Nafud are the coalesced harrats Khaybar, Ithnayn and Kura with an area of 20,560km2 and 327 scoria cones, 46 basaltic shield volcanoes, 20 domes, 5 tuff cones, one basaltic stratovolcano (Jebel Qidr) and 39 massive and very long "whale-back" lava flow. These the biggest and longest basalt flows in western Saudi Arabia and contain the biggest and most extensive lava-tubes.

The volcanoes represent a completely new N-S crustal rift that began forming only 10 million years ago in western Saudi Arabia. So in a few tens of millions of years there might be a new ocean forming along this line similar to the Red Sea".

from: The lava fields of Saudi Arabia and the formation of the Kishb lava tubes



Map: The main harrats in Saudi Arabia. From M.Moufti et al. Journal of Asian Earth Sciences, 62, 253 (2013)

References

1. https://www.volcanocafe.org/volcanoes-of-saudi-arabia/

2. https://www.volcanodiscovery.com/saudi-arabia.html

3. The Miracles of Exodus : A Scientist's Discovery ofExtraordinary Natural Causes of the Biblical Stories. Prof. ColinHumphreys of Cambridge University. Noel Donnelly

Editor's note: Saudi Arabia has active volcanoes in the west and northwest of the country. Volcanic activity is related to hot spot activity on the Arabian Plate which was uplifted on the eastern side of the Red Sea rift. The basaltic lava fields in the western part of the country are called harrats.

VISIT TO KIMMERIDGE Saturday 9th February 2019

Kimmeridge Clay was laid down in periodically anoxic conditions in a subsiding marine basin 150 million years ago in the late Jurassic. It is composed of some 500 metres of clays, oil shales, bituminous shales, coccolith limestones and dolomites of the stone bands characteristic of this area. Kimmeridge Clay contains 13 ammonite zones, five in the Lower and eight in the Upper part. Due to the anoxic conditions fossils have been preserved very well and many of them can be seen in the rocks and superb ones at Steve Etches Museum in the Village.

We arrived at Kimmeridge Bay on a very blustery day. The tide was high and the rough waves were crashing into the cliffs so much so that seawater was spraying over onto the car park. The brave windsurfers were certainly enjoying themselves and moving at great speed. We spent the morning moving westwards along the SW Coastal Path towards Gad Cliff, with Alan Holiday discussing and explaining the rock formations in the area.



The 'Nodding Donkey' (AH)

Our first stop was at the nodding donkey oil well which has been in position since 1961, which is cleverly camouflaged, been painted and positioned so that it is not easily seen from the bay itself. Due to erosion the original road to it became unsafe and had to be moved back from the cliff face. An archaeological dig at the time unearthed artefacts from the Roman and Iron Age. The oil is being pumped up from the Cornbrash reservoir rock at a depth of around 350 metres. The oil originates in much deeper rock in the form of Lower Jurassic, Lower Lias clays similar to those seen at Lyme Regis. The well originally produced 350 barrels/day but it still produces around 65 barrels/day. The oil is stored on site and taken by road tanker to the Wytch Farm gathering station near Wareham from where it goes by pipeline for refining.

The well is located on the crest of a gentle up-fold known as an anticline. Anticlines are one of the classic types of oil traps where oil and gas can accumulate. The Kimmeridge Clay is also hydrocarbon rich and some beds are termed an oil shale. The oil shale formed from muddy sediment deposited in the sea around 150 million years ago. The plankton living in the sea, when it died, sank to the sea floor and was preserved in the mud producing the high organic content. The oil shale is very noticeable as it is black in colour with a



low density due to the high carbon content rather than mineral content and back in Victorian times the oil shale was exploited commercially. It was not however deep enough or under the right conditions to produce an oil rich reservoir but Kimmeridge Clay has produced the oil and gas in the North Sea.

As we continued westwards, Alan pointed out the pale Dolomitic hard stone bands of limestone which could be easily seen in the Kimmeridge Clay cliffs. They could be followed dipping east-wards around the bay. He explained that they were formed by diagenetic chemical changes a million or so years after they were laid down, so they are secondary limestones. Dolomitic limestone is magnesium rich (calcium magnesium carbonate) rather than the normal calcium rich limestone (calcium carbonate). These hard bands could also been seen looking down onto the beach at Broad Bench as the softer shale had been eroded away. The three we saw were the Flat Stone Bed, Washing Ledge Bed and the Maple Ledge Bed.

Battling with the windy conditions and trying to keep up with Alan who walks at speed, we walked further west and up the hill to get a better view of the magnificent Gad Cliff. Here we could see the dark shale of Kimmeridge Clay at its base then Portland Sand and finally the yellow white cliffs of Gad Cliff made of



Portland Stone which has withstood weathering making them stand out prominently. Further to the West we could see Worbarrow Tout and the white Chalk cliffs of the Worbarrow Bay.

Across the bay to the East we could see the Clavell Tower on Hen Cliff which was built in the 1800's by Mansell-Pleydell. Due to erosion of the cliff the tower was moved in 2007/8 about 25 metres from its original site, stone by stone, at a cost of £800,000 by the Landmark Trust. The tower consists of dolomitic limestones from Kimmeridge Bay and Portland Stone. You can stay in

the tower with amazing views for a weekend for just less than £1000!

In the afternoon we carefully made our way along the beach itself, taking care not to slip on the rocks. To the east of Gaulter Gap was a good example of a normal fault which had been formed by earth movements, with the opening of the Atlantic Ocean during the Cretaceous causing stretching and displacement. In the fault there were breccias mineralised with calcite and the Maple Stone Band ledge to the east of the fault had been



dragged up. On inspection of the shale we could see that where it had been exposed and was bumpy which was due to the continued wetting and drying out and the formation of salt crystals causing the flakiness. Washing Ledge Stone Band can be seen dipping westerly until it appears as the ledge that runs out to sea opposite Gaulter Gap. (No doubt named because it was a useful place for locals to do their washing with water on both sides of the ledge!) It is also a useful place to observe marine life. Just east of the cottages the remains of a human female skeleton were found in this area in 2000. Apparently a small cliff fall had dislodged the stones from around her grave and the skull and limb bones were visible on the shore. It was established after forensic examination that she was a 25 year old pregnant female from the Bronze Age.

We walked along the expansive exposed Flat Stone Bed made of dolomitic limestone on the west side of the bay. The name Flat Stone Band is ironic, as this bed is anything but flat, being characterised by polygonal dish-shaped structures and small scale thrusts which appear to have resulted from the chemical alteration and consequent expansion of the stone band while buried. This dolomitic limestone bed looks very dramatic as it is so deformed with undulations, cracking and sheared surfaces. Why this happened is unclear but must be due to an increase in the volume of the rock after it had been formed and then being deep down had nowhere to escape to. This probably is due to pressure caused by the plate movements in the Cretaceous period and also the Alpine Orogeny. Our understanding of the Kimmeridge Clay Formation, and the conditions under which the sediments accumulated, is still disputed. The strata exposed in the cliffs are composed of a number of different sediment types. Mudstones with varying amounts of carbonate and show some signs of bioturbation. Shales, containing more organic matter which splits easily, were formed in an oxygen starved sea floor where organic rich detritus accumulated, and where no living animals churned the sediment. In contrast starkly white fine grained limestone bands are occasionally present formed from coccoliths during a bloom rather like those we witness in modern seas. The 4 types being A Clay, B Bituminous Clay, C Oil Shale and D Coccolith Limestone. Geologists have referred to these recognised patterns in the succession of the sediment as cycles or rhythms and have tried to explain them by the astronomical cycles, named the Milankovitch cycles after the man who first discussed them. Here at Kimmeridge the cylces are often incomplete and the repetition is mainly ABAB. In the very deep waters the bottom waters became nutrient rich but if strong winds mixed the waters allowing the nutrients to escape upwards this would lead to dinoflagellate blooms and if conditions persisted coccolith blooms. Such blooms would cause oxygen depletion because of decay and instead of just the deeper waters being anoxic almost the whole water column up to 10 metres below the surface would be. Following this period of anoxia, photogenic phytoplankton would bloom creating oxygen and introducing it back to the lower waters again with its consequences.



We noticed quite a number of fossils, including bivalves and ammonites. We recognised the large ammonite *Aulacostephanus autissiodorensis* which is sexually dimorphic, the female being larger than the male. We also saw fossilised Aptychus mouthparts of ammonites. Members of our group also found fault breccias with calcite deposition and slickensides of calcite mineralisation.



The movement is in an area where there had been earth movements and faulting. The fossils are very well preserved because in the deeper waters of the Kimmeridge Clay sea (still continental shelf conditions) there was little oxygen on the sea floor at times and so anything that died was not so likely to be eaten by scavengers and survived to become fossilised. The fine-grained sediment of the Kimmeridge Clay helped to produce detailed preservation. Kimmeridge Bay is important as it is a marine reserve because of the exceptional marine flora and fauna that can be seen along the shoreline and further offshore.

As a volunteer Marine Warden at the Wild Seas Marine Centre I ended our trip by going into the centre and ending a wonderful day with tea and cake! We were as always very grateful to Alan Holiday for a very informative and interesting field trip.

Report by Val Fogarty with pictures by Pauline Dagnall unless otherwise credited.

Book Review

Dinosaurs of the British Isles by Dean R. Lomax & Nobumichi Tamura. Siri Scientific Press 416pp 2014 £29.99 https://siriscientificpress.co.uk/

The term 'dinosaur' was invented in Britain in 1841 by Richard Owen. The first four dinosaurs described in the world were from English fossils. The Isle of Wight is often described as the dinosaur capital of Europe. Britain has examples of every group of dinosaurs except horned and domed-headed groups, with over 100 species named from British fossils. Yet there is very little written specifically on British dinosaurs. This is the only book on the subject and covers every aspect of dinosaurs.

The sections include What is a Dinosaur?, The age of Dinosaurs, Naming and Classification. The types of dinosaur are described, i.e. Saurischian (lizard hipped) and Ornithischian (bird hipped), dinosaur discoveries with the origin of the name (1841-1842) and the first description of bones (1677) to early reconstructions at Crystal Palace.

Also briefly covered are the fossilisation process, Trace Fossils, and dinosaur contemporaries (e.g. Ichthyosaurs). The main part of the book is a geological history of dinosaurs from the British Isles. This is covered chronologically from the late Triassic to the late Cretaceous, often in quite fine time slices e.g. the Purbeck Limestone Group and the Wealden Group. For each section there is a paleogeographic map and a brief stratigraphic description. Then individual species are covered by life reconstruction artwork and a skeletal reconstruction diagram. This is followed by a data panel covering meaning of the name, geological horizon, locality found and where the fossil is stored or displayed. There is general information on the fossil discussed followed by photographs of the fossils (i.e. bones/ teeth etc.). In conclusion, the artwork is good, the photographs are good and the text is good, not too technical and there is a glossary. If you are into studying dinosaurs you should have it.

News: Impact crater 19 miles wide found beneath Greenland glacier

Talking of dinosaurs, I was reminded of this news article which appeared towards the end of last year in the Guardian.

"A huge impact crater has been discovered under a half-mile-thick Greenland ice sheet. The enormous bowl-shaped dent appears to be the result of a mile-wide iron meteorite slamming into the island at a speed of 12 miles per second as recently as 12,000 years ago.

The impact of the 10bn-tonne space rock would have unleashed 47m times the energy of the Little Boy nuclear bomb dropped on Hiroshima in 1945. It would have melted vast amounts of ice, sending freshwater rushing into the oceans, and blasted rocky debris high into the atmosphere. At 19.3 miles wide, the crater ranks among the 25 largest known on Earth and is the first to be found beneath an ice sheet. "You have to go back 40 million years to find a crater of the same size, so this is a rare, rare occurrence in Earth's history," said Kurt Kjær, of the Natural History Museum of Denmark in Copenhagen."

I'm glad to read it's a rare occurrence! Presumably this would have generated tsunami-type waves flooding adjacent coastlines, including those around the North Sea and English Channel. Could it be linked to an earlier Brexit event? Kelvín Huff

DGAG Field Trips and allied events 2019	DIGS (Dorset's Important Geological Sites)
Contact Kelvin Huff or Alan Holiday using the contact details below to book a place on our field-trips. £2.00 day trip charge.	The group welcome anyone wishing to help with conservation work on Local Geological Sites. Please contact Alan Holiday if you are interested.
Wednesday March 13th Lecture: "The end of the Cretaceous: global and local perspectives ". Prof. Andy Gale, 7-9 p.m. Dorset County Hall. £5.	Working parties go out on both weekdays and weekends. <u>alanholiday@btinternet.com</u>
Saturday 23 rd March: Purbeck area including a quarry. Leaders: Trev Haysom and Alan Holiday. 10.30 start.	Wessex OUGS events Please contact Jeremy Cranmer on: wessexdaytrips@ougs.org or telephone 01305 267133 to book a place. £2.50 day
Wednesday April 10th Lecture: " The deep structure be- neath the Dorset region". Dr. Malcolm Butler. 7-9 p.m. Dorset County Hall. £5.	trip charge. 9th March: Palynology at Southampton University. Professor John Marshall.
Thursday April 18th Ringstead Bay. Corallian and Lower Kimmeridge sequences. 10.30 start from main car park.	6th April: OUGS AGM. Swindon.
Friday 3rd To Monday 6th May: Weekend residential field-trip to the Vale of Glamorgan. Contact Kelvin Huff for more details and registration.	 13th–14th April: Geology of the Isle of Wight. Dr Steve Sweetman. 19th–24th June: Geology of the Isle of Man, David Burnett and David Quirk.
 4th-5th May: Lyme Regis Fossil Festival. Thursday June 20th: Haytor and Dartmoor. Leader: Alan Holiday. Thursday 4th July: Lyme Regis area, led by Geoff Townson. 	7th July : Geology and archaeology walk, Abbotsbury area. Kelvin Huff 11th August: Graphic logging, Upwey. Fiona Hyden.
Saturday August 17th: Portishead with Alan Holiday. September (date tbc): Exmouth and Budleigh Salterton Saturday October 26th: Holiday Rocks.	<u>Reminders</u> : This will be the last Newsletter for members who haven't renewed for 2019. <u>Committee news:</u>
Saturday November 16th: DGAG Annual Dinner. Website: https://dorsetgeologistsassociation.org/	We still need an Events and a Fieldtrip Officer! <i>Kelvín</i>

	DGAG Commit	tee Members	S
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		789643	
Secretary, Newsletter Editor	Kelvin Huff	01305	kelvinhuff30@gmail.com
and Sales		265527	
Treasurer and Membership	Alison Neil	01305	alison.neil@madasafish.com
Secretary		832937	
Fieldtrip Officer	Vacant		
Website Manager	Geoff Rowland		rowland.geoff@gmail.com
Events Officer	Vacant		
Lectures and OUGS Liaison	Jeremy Cranmer		jeremydorset1@hotmail.co.uk
Ordinary	John Larkin		jalarkin3@yahoo.co.uk
Ordinary	John Scott		johnandsuescott16@gmail.com
Ordinary	Robert Chandler		aalenian@blueyonder.co.uk

Held on 12th January 2019 at Broadmayne Village Hall

The Chairman welcomed members to the AGM of the DGAG. There were 34 attendees, including 2 visitors.

1. Apologies for absence had been received from R. Musgrove, R. and S. Alderman, J. Scott, J. Craddock, H. Lewis, A. Langley, M. Wright, L. and C. Morley, P. Why, R. Chandler, I. Hacker, H. Hacker.

2. Minutes of last AGM.

The minutes were accepted as a true and accurate record of the meeting.

3. Matters Arising.

Item 4.1: Bournemouth Geological Terrace. Alan reported things are at still at a hiatus, owing to BU's reluctance to allow any marking or labelling of the specimens. He has, however, received a copy of the catalogue of specimens from a contact in Norfolk. A.O.B. DGAG has made a donation of £200 to the John Muir Trust in memory of John Chaffey, following advice from Ruth Chaffey.

4. Officers Reports.

4.1 Chairman

I am sure it is obvious to all of the members of DGAG that the past year has been a challenging one with the loss of our long-time committee member Doreen who did so much for the group ever since its establishment in 1993. She gave so much to the group over the years with key contributions of running the website, producing the newsletter since June 2000 and providing feasts on innumerable occasions for the Chairman's/President's picnic and Christmas Workshop. Doreen also contributed to DGAG funds by selling things on eBay and making a significant contribution to the production of the 10th Anniversary field guide Coast and Country. Geology Walks in and around Dorset. The profit from the sale of the 2000 print run gave DGAG a very useful bank balance supporting the group since 2003. It is difficult to summarise Doreen's contribution in a few words and Bob Chandler's obituary for Doreen in the G.A. Magazine revealed many interesting facts of which I was unaware. Doreen was not one to blow her own trumpet. A good place to remember Doreen is by visiting the Etches' Collection and sitting on her Portland Stone bench and looking out over Kimmeridge Bay. Thanks to the great efforts of Committee Members especially Kelvin we have pulled through and continue producing a newsletter with Geoff revamping the website has helped the smooth running of the group in a difficult period. We have continued with our programme of monthly events although not all of them have been successful. One event in particular sticks in the mind with the washout of a field trip along the Fleet in February. Fortunately, the April field trip to the Barton Section was grey but not a washout. The annual building stone field trip to Salisbury was very good with the Cathedral visit thrown

in (made famous of course by Russian interest). The field trip to Shropshire and the Black Country went well helped by excellent weather at the beginning of our roasting summer. The Chairman's (bring your own) Picnic was similarly blessed with excellent weather at Worbarrow Bay. The highlight, from my point of view, was the amazing fossil log exposed in the Wealden Beds. It is such a pity this sort of thing doesn't survive once exposed. Unfortunately, the weekend chosen for the Square and Compass fossil event was a bit of a washout with 'play' abandoned on the Sunday in case the marquee blew down! Ten days later the Charterhouse field trip to the Mendips was another sizzler with dehydration a problem by the end of the day. So, a good programme with many memories and thanks to Kelvin and Malcolm for organising the programme. It is a great disappointment that Malcolm has had to step down just as he was getting into job, but we wish him well as he moves on. I am sure one of our members would love to take up the challenge! As usual there have been lots of other happenings especially working with other groups such as Wessex OUGS, DIGS, Rockwatch, U3A. We are very lucky to have strong teams working to promote earth science in the area and I hope that in 2019 you will make the most of it.

4.2 Secretary

It's been a busy and challenging year. The Committee met every three months in 2018 plus a working party meeting but excluding the A.G.M. The committee has changed over the year and I'm pleased we could welcome Jeremy, Malcolm and Geoff as new members. Malcolm stepped forward as our new FTO in January 2018 and I'm grateful to him for relieving me of fieldtrip organising duties! I'm still organising the annual residential but that may change too from 2020 as I know Malcolm has plans. One of my major tasks for 2018 was dealing with the new GDPR law which came into force in May. For various reasons the forms went out later than I would have liked to members and I was still getting returns in September. I have now had returns from 89 members giving their consent by the various contact methods (post, e-mail, phone, etc.) I was initially concerned my e-mail list would dwindle owing to GDPR but that now stands at 86, so the majority of members receive them. On a monthly basis, members on my e-mail group receive updates and details of forthcoming events. I've also kept members updated with communications from the G.A and other geological news. This of course is in liaison with Geoff (website) and Malcolm (fieldtrips) so between the three of us we try to keep you up-to-date. The Facebook Group continues to work well and is updated pretty regularly with photographs and features. I've also used the page to set up invitations to fieldtrips and other events. We had a very successful residential weekend in Shropshire (led by Noel Donnelly) and the Black Country (led by Graham Worton) in May. This year, John Scott is showing us around South Wales with hopefully a visit to the National Museum of Wales included. I'm really looking forward to it and there are places available. Our 5th annual dinner took place in November at the Wessex Royale Hotel in Dorchester, with Dr. Robert Chandler as the quest speaker. I should have emphasised this was also our 25th anniversary! Everything seemed to go well and Bob provided an entertaining talk on fossils in France afterwards. I'm grateful to Jeremy for taking the organisation of the dinner over from me from November 2019. The Dorset Building Stone website continues to grow, which is a side-line project I'm involved with, along with several DGAG members. Once again, my thanks go to the members but especially the committee for their advice and support over another busy year. With such a committed bunch of people the future of DGAG is assured.

4.3 Treasurer

It has been an unusual year this year, because of losing Doreen who used to do such a lot for DGAG, but we are adapting well and our balance sheet shows that. There are just a few points to explain. First it is good to note that we still have a significant balance at the end of this vear of about £4800. Over recent past years we have been spending more than our income, but this year the shortfall was only about £335, so less than in recent years. We are now aiming to increase our income and decrease our expenditure to eliminate the shortfall, or at any rate to decrease it further. Our income from subscriptions did well as we regularly recruit new members. We are very grateful to Peter Fookes for his generous donation of £200. We have also received a donation from another long-standing member, Margaret Dyos for which we are also very grateful, but it will appear in next year's accounts. Our newsletters appear to have cost more this year. Doreen produced the December 2017 newsletter and the February one, which cost £340 between them. Then Kelvin produced one in June and one in September (and of course since then there has been one in December); these are now sent to outside printers and look rather smart; we bought the software "MS Publisher" needed to edit them, which cost us a one-off £110; each print run now costs us just over £100, before postage is added. The plan is to continue with 4 newsletters a year. Looking at our other costs you will notice that we gave £400 in donations; this was £200 to the John Muir trust in memory of John Chaffey and £200 to the fund for Doreen's memorial bench at the Steve Etches Collection. You will also notice that our website appears to have cost nothing, which isn't quite the case. As you probably realise, we now have a new website run by Geoff Rowland who created it for us last summer; the cost so far has been about £33 but that will appear in next year's budget. We are hoping that the overall cost will be less than in recent years. There were no sales last year, but that won't be so next year, as Kelvin made nearly £100 at

the recent Christmas workshop, so while last year's Christmas Workshop cost us more than £100, this year's one will bring in a profit, thanks not only to the sales but also to the very generous donations of food from many members. The Chairman's Picnic/field trip did take place in July, but participants brought their own picnics so no cost to DGAG was incurred. As usual the dinner breaks even apart from DGAG paying for the speaker's meal. So, I think DGAG is doing well in spite of quite a few changes this year, and I would like to thank everyone who has worked to smooth them through, especially Alan and Kelvin and members of the committee. My thanks also go to Roger Chapman who has verified the accounts again this year, and is always supportive and encouraging. The accounts were approved by members, Proposed Jeremy Cranmer, Seconded Anne Larkin.

4.4 Field Trip Officer

In Malcom's absence the Secretary read out his report. The group undertook seven-day trips last year. These included a thoroughly wet day at the Fleet, the avoidance of contamination at Salisbury Cathedral, underground stone quarrying on Portland, lead and tin smelting at Charterhouse on the Mendips and coastal structures at Milford on sea. We also made visits to Worbarrow Bay and Swanage which, no matter how often they are visited, vield new interesting information. So that is the intrigue of the day trip programme there is always something new to be seen and learnt. In addition, they have all been extremely enjoyable social occasions with much interchange of knowledge between participants and affable conversation. The average attendance is 15 members, with just over half the regular attendees supplemented by a variable make up of others. An interesting and varied programme of field trips depends entirely on members volunteering to lead or member's contacts with knowledgeable leaders. So please come forward if you have any suggestions or ideas for field trips. For personal reasons I now stand down from this post. The early part of next year's programme has been established so might I encourage a volunteer to step forward for this not too onerous position and support the tireless work undertaken by Alan and Kelvin in particular.

4.5 Events

The Secretary is covering this post for the time being but we really need a long-term successor (please volunteer!) Including this A.G.M, I've taken over the bookings made for this venue on behalf of DGAG. The Chairman's Picnic didn't have its usual format for obvious reasons and we have yet to decide how it will run in future but perhaps the 'bring and share' model would work. The Holiday Rocks event went well in terms of talks and refreshments, the latter being contributed by the Committee. However, I thought the attendance was disappointingly low at 15 members. We have decided to start charging a small admission fee for such events to help offset hall hire fees and I hope members will view this as a reasonable initiative. The December Workshop went well with over 30 attending and a good range of displays. The 'bring-and-share' approach to the lunchtime buffet meant there was plenty of food although next year I may send a sign-up list round to avoid duplication. Thanks to everyone who helped, either by contributing food, or a display or setting up/taking down and washing-up - it wouldn't happen without you.

4.6 Newsletter:

Doreen's last newsletter was the February 2018 edition and she passed away the following June. That event prompted me to cobble together what I thought would be an interim newsletter to keep members up to date. That was the Summer Newsletter edition, marking a departure from the previous bi-monthly pattern. This followed a recommendation by a Committee working party to reduce the Newsletter frequency to four per year, partly to reduce demands on our shrinking funds. Hard copies of the newsletter go out to 98 members, with a further 16 members opting for a digital (.pdf) version. The cost of the printed newsletter comes at a little under £2 per copy. The digital one only costs my time! It was a learning experience for me as I had to start from scratch and without a member's newsletter database. Two further editions have followed since then. Finally, I'd like to extend my thanks to everyone who has provided material for the newsletter in the form of field-trip reports and regular or occasional features. For the time being, it looks as if I'm stuck with the job but don't hold back if you'd like to take over!

4.7 Website

Towards the end of July 2018, I was asked by the DGAG committee to 'rescue' the content of the former DGAG website (http://dorsetgeologistsassociation.com) and build a new 'front-end' web presence for the group. This was essentially completed during August 2018, though continues to evolve. The new website, using the open-source WordPress platform, is at: https://dorsetgeologistsassociation.org (note the .org rather than .com). Hosting costs are currently ~£5 per month (including monthly backup) with an additional ~£15 per year for domain registration. 'Behind the scenes', the memory footprint of the new website has been reduced, which has prevented the occasional instability which occurred when the site was first set up. Security (firewall and regularly updated digital certificate) has also been improved. Also, the WordPress platform has undergone a major update from version 4.x to 5.x. This will allow more user-friendly and flexible options for editing content and layout. All WordPress plugins (e.g. Events list, PDF display) have been regularly updated to fix bugs and security issues. Content, in particular the Events list, has been updated as information becomes available. N.B. a 'Featured Image' is always welcome to accompany postings. Alan Holiday's new leaflets on the Dorset and East Devon World Heritage Coast can be downloaded as PDFs. Digital content of the Purbeck Keystone CD has been 'rescued' and will be placed on the website as half-

price PayPal downloads. Potential plugins for this have been identified. Now updates and security have been addressed, these will be tested and deployed. Still no progress in getting dedicated @dorsetgeologistsassociation.org Email addresses. Requires GA action to confirm we are a local 'branch' of their registered charity. Web-forms are working as a mechanism to recruit new members. The 2D/3D geological map continues to evolve. Following requests, links to weather forecasts, weather warnings and tide times have been added to the home page. As a result of dynamic content and visitor traffic etc, the new site has floated up the Google rankings. Keep clicking! I have a small stock of business cards for the new DGAG website, if folks wish to use these for promotion. Always happy to add other relevant content or consider other website functions.

4.8 Sales

The Secretary is covering this post for the time being but we really need a long-term successor (please volunteer!) Sales have been at a hiatus since Doreen decided to stop selling on our behalf. However, our funds aren't limitless and we do have significant outgoings. Therefore, it is a good idea to boost funds by sales at our various events. The sales stall at the December workshop more than covered the hall rental fee for example. That said, we are dependent on the kindness and generosity of others for what we sell! We were fortunate this time to have two big sales donations. The first was donated by Tom Sharpe at the National Museum of Wales and the second was from long-time DGAG member Michael King. We are grateful to both for their generosity. If you have items of geological interest that we might be able to sell please let me know. Equally, if someone would like to take over as Sales Officer also please let me know.

4.9 OUGS Liaison

Jeremy has liaised effectively with Malcolm and Kelvin regarding the field-trip programme and events for both groups are on their respective websites.

4.10 DIGS

Looking back over the records, to my amazement, this is my 14th year as Chairman and I am pleased to say that the past year has been as successful or more so than many of the previous years. This has been achieved by the unstinting efforts of members who have continued to contribute in many ways. The management meetings are always fruitful and subsequently give rise to excellent conservation sessions at our many sites. Not everyone can be at the meetings, but they contribute with knowledge and ideas by email. I am particularly thinking of the invaluable contribution of Jo Thomas who as founder member of DIGS has considerable knowledge of local geology and geological conservation. Another helper in the background has been Gillian Gunner who managed to avert a major crisis due to the loss of the website domain. She also updated the website with great regularity. Her role has now been taken over by Geoff Rowland, our website supremo! Fortunately, we continue to attract new members and their energetic efforts at conservation sessions is of great importance. During the past year we have had sessions at Holt Farm, Upwey Road Cutting (where we even had a Belgian film crew recording our efforts), West Hill Chalk Pit, Red Lane, Wanderwell (several sessions!), Vinney Cross, Hardown Hill, Rockpit Farm, Todber, Poxwell and Portesham. We have also been working on registering the new site in Weymouth with the Rodwell Trail Cutting thanks to Geoff (Pettifer). There are now developments associated with the Crookhill Brick Pit site at Chickerell, Weymouth which is an SSSI and L.N.R. which is seriously in need of TLC. The group has also worked outside the county at Vallis Vale to clean up the De la Beche site in preparation for a Wessex OUGS field trip. We have also carried out work at Kingbarrow Ouarry n Portland, a DWT site where the Fossil Forest horizon is exposed. We have reached out into the community and made a contribution at the Lyme Regis Fossil Festival (May), Square and Compass (July) and the Hampshire Mineral and Fossil Show at Lyndhurst (September). Unfortunately, the Square and Compass event was not too successful due to very poor weather; how can that be in the summer of 2018!? The enthusiasm of our members makes DIGS one of the most successful conservation groups in the country. Just to make my life even busier I have joined the Geology Trust and have been proposed as a member of the committee of GeoconservationUK, the umbrella group for RIGS/LGS activity. We continue to look for members who are keen to help with our conservation brief. Come and join us!

5. Election of New Committee

Hilary Barton proposed a vote of thanks to the 2018 committee. All existing committee members agreed to serve for another year, excepting Malcolm Wright, who is standing down.

The committee Members for 2019 are:

Chairman/ DIGS	Alan Holiday
Secretary/ Newsletter	Kelvin Huff
Treasurer	Alison Neil
Website	Geoff Rowland
OUGS Liaison	Jeremy Cranmer
Events	Vacant
Field Trip Officer	Vacant
Sales	Vacant
Ordinary	John Larkin
Ordinary	John Scott
Ordinary	Bob Chandler

6. Proposed increase in Membership fees from 2020

Following discussions at the 2018 AGM and recommendations from the DGAG Committee working party in March 2018, Alison outlined the proposed new annual fees:

Ordinary Membership fees to increase from £12 to £15.

The Student fee will stay at £9.

A new category for Joint membership of £25 will apply.

'Newsletter only' from £7.50 to £10. This is not being offered as an option to new members. The proposal to adopt the new scale of fees was made by Adrian Neil and seconded by Kelvin Huff. The proposal was agreed unanimously by the members present.

7. Proposed introduction of a field-trip fee.

Following recommendations from the DGAG Committee working party in March 2018 it was proposed to introduce a charge of £2 per head for field-trips. This should make field-trips self-financing and cover the costs of the leader's gift and any other expenses, including duplicating costs. The proposal was agreed by a large majority of the members present with one against. The meeting also agreed to introduce a small charge for other indoor events to make them self-financing.

8. A.O.B

a) DCM lectures and the DGAG

The Dorset County Museum lectures have been postponed until the museum re-opens in the summer of 2020. Jeremy was worried about the continuity of the lectures being threatened and suggested that DGAG take them over in the interim. The outcome is that we will go ahead and that the lectures will take place in Committee Room 1 at Dorset County Hall. The first lecture took place on January 9th (Oil in Dorset by Alan Holiday). This was well-attended (41 present) and the next three have already been arranged. Jeremy is confident that will have a complete programme through to June 2020. A charge of £5 per head per lecture is made and the intention is to make them cost-neutral to DGAG. Obviously, we have to cover venue hire and speakers" expenses. The intention is to have displays by DIGS, DGAG, Jurassic Trust, etc. aimed at promoting geology in Dorset. Advertising will occur via newsletters, e-mail, Facebook and relevant websites.

b) The Lyme Regis Fossil Fair

This falls on the same weekend as the South Wales field-trip (4th-5th May) so DGAG will not be represented unless someone volunteers please.

c) GeoWeek, 4th-12th May 2019

Members were asked for suggestions for an event to mark GeoWeek, possibly involving children and ideally with community involvement.

There were no further items of A.O.B. The meeting closed at 3.15 after a vote of thanks to the Committee proposed by Charles Jackson.

The AGM was followed by refreshments.

Members then enjoyed a well-illustrated talk on coastal protection schemes in south Dorset by Alan Holiday. Alan concentrated on the schemes involving Bowleaze Cove, Overcombe, Furzy Cliff and Preston Beach Road.

	COSTS		INCOME		COSTS	
36.50	Newsletter	903.02	Subscriptions	1194.00	Newsletter	722.74
0.00	AGM	36.10	AGM	00.00	AGM	30.00
0.00	Picnic	0.00	Picnic	63.00	Picnic	91.36
	Lyme Fossil Fair	48.80			Lyme Fossil Fair	94.45
00.00	Autumn Event	38.80	Autumn Event	0.00	Autumn Event	38.80
81.00	Christmas workshop	184.21	Christmas workshop	75.00	Christmas workshop	175.55
	Field trips	137.25	Sales	41.00	Field trips	63.57
00.00	Gifts/donations	400.00	Donations	0.00	Gifts/donations	14.95
2.31	GA insurance	171.36	Interest	2.03	GA insurance	171.36
	Website	0.00			Website	125.00
	Officers expenses	86.38			Officers expenses	289.74
74.55	Dinner (2017)	473.45	Dinner (2016)	77.85	Dinner (2016)	352.55
50.00	Dinner (2018)	300.00	Dinner (2017)	449.10	Dinner (2017)	300.00
44.36	Total Expenditure	2779.37	Total Income	1901.98	Total Expenditure	2431.27
35.01			Income-expenditure	-529.29		
ice she	et for 31st October 2018		ayint an	Balance Sh	neet for 31st October 2017	
42.05	Bank balance 31.10.47	4721.23	Balance 31.10.16	5671.34	Bank balance 31.10.17	5028.24
35.01	Petty Cash 31.10.4	85.81	+Income- Expenditure	-529.29	Petty Cash 31.10.17	113.81
07.04	Total	4807.04	Balance 31.10.17	5142.05	Total	5142.05
provide the second						
0 0 0 0 0 0 0 0 0 0	6.50 0.00 0.00 0.00 0.00 2.31 2.31 2.31 2.05 5.01 7.04	6.50 Newsletter 6.50 Newsletter 0.00 Picnic 1.00 Picnic 1.00 Christmas workshop 7.04 Field trips 0.00 Gifts/donations 2.31 Website 0.00 Dinner (2017) 0.00 Dinner (2018) 0.00 Dinner (2018) 2.01 Esheet for 31*t October 2018 2.05 Bank balance 31.10.13 5.01 Petty Cash 31.10.13 7.04 Total	COSTS 6.50 Newsletter 903.02 0.00 AGM 36.10 0.00 Lyme Fossil Fair 903.02 0.00 Christmas workshop 184.21 Field trips 137.25 0.00 0.171.36 Vebsite 0.00 0.16 Christmas workshop 171.36 0.00 Officers expenses 86.38 0.1 Fotal Expenditure 2779.37 5.01 Bank balance 31.10.47 472.123 Petty Cash 31.10.48 85.81 7.04 Total	COMEG.50NewsletterSG.10Multime0.00Picnic903.02SG.10SUbscriptions0.00Picnic0.00PicnicAGM0.00Lyme Fossil Fair48.80Autumn Event1.00Picnic0.00Christmas workshop184.211.00Christmas workshop184.21Sales0.00Cifts/donations171.36Autumn Event1.00Cifts/donations171.36Donations0.00Cifts/donations171.36Donations0.00Cifts/donations171.36Donations0.00Cifts/donations171.36Donations0.00Cifteers expenses86.38Donations0.00Dinner (2018)300.00Dinner (2017)0.00Dinner (2018)300.00Dinner (2017)0.00Dinner (2018)300.00Dinner (2017)0.00Dinner (2018)300.00Dinner (2017)0.00Dinner (2018)300.00Dinner (2017)0.00Dinner (2018)300.00Dinner (2017)0.00Bank balance 31.10.47473.450.01Petty Cash 31.10.47Balance 31.10.160.02Petty Cash 31.10.47Balance 31.10.160.03Petty Cash 31.10.47Balance 31.10.160.04Petty Cash 31.10.47Balance 31.10.17	COSTS INCOME 6.50 Newsletter 903.02 Subscriptions 1194.00 0.00 Picnic 36.10 Picnic 1194.00 0.00 Picnic 36.10 Picnic 0.00 0.00 Lyme Fossil Fair 38.80 Autumn Event 0.00 1.00 Christmas workshop 137.25 Sales 41.00 0.00 Christmas workshop 137.25 Sales 41.00 0.01 Christmas workshop 137.25 Sales 0.00 0.137.25 Sales 0.00 Christmas workshop 75.00 0.110 Christmas workshop 171.36 Picnic 2.03 0.111.35 Website 0.00 Interest 2.03 0.00 Officers expenses 86.38 Dinner (2018) 77.85 0.00 Dinner (2018) 300.00 Interest 2.03 2.03 0.00 Dinner (2018) 300.00 Interest 2.03 2.03 0	COMENECOMENECOMECOME6.50Newsletter903.02SubscriptionsNewsletter0000.00Princic36.10Princic30.00Princic0.000.00Princic0.00Princic0.00Princic0.000.00Princic38.80Autumn Event0.00Princic0.000.00Princic0.00Princic0.00Princic0.000.00Princic137.25Sales41.00Princic0.00Christmas workshop171.30PrincicPrincicPrincic0.00Christmas workshop177.35PrincicPrincicPrincic0.00Christmas workshop177.36PrincicPrincicPrincic0.00Christmas workshop177.36PrincicPrincicPrincic0.00Christmas workshop177.36PrincicPrincicPrincic0.00Christmas workshop177.36PrincicPrincicPrincic0.00Christmas workshop177.36PrincicPrincicPrincic0.00Christmas workshop177.36PrincicPrincicPrincic0.00Christmas workshop177.36PrincicPrincicPrincic0.00Christmas workshop177.36PrincicPrincicPrincic0.00Christmas177.36PrincicPrincicPrincic0.00Christmas177.36<

Dorset Geologists Association Group Balance Sheets and Income and Expenditure Accounts 2017-2018

Income and Expenditure Account 2017-2018

Hon. Treasurer - A.Neil An Will 5.12.18

5 per 2018

RA Chappen

Verified as a true record by R. Chapman